DISPUTES AND CONVERTIBILITY OF LUMP SUM CONTRACTS IN SAUDI ARABIA

BY

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Dedication

Dedicated to My Beloved wife, daughter and family who are the source of my inspiration, motivation, encouragement and adaptation.

Acknowledgment

All the prayers and thankful to all mighty Allah who embrace me with patience, courage to learn and write this thesis as a small contribution to the construction industry knowledge.

This thesis is the output of my work for the last three and half years in the short journey of education, where I have been surrounded proudly by the doctors and engineers, and now I have the opportunity to express my gratitude to all of them. The first person in this series is my thesis advisor, Dr. Ali. Shash, my complete gratitude and appreciation goes to his constant assistance and guidance. Thanks are also to my thesis committee Prof. Abdulaziz A. Bubshait and Dr. Laith Al-Hadidi for their understanding, cooperation and induction through my study in university. A distinguished mark are left in my career in particular is due to CEM Department and King Fahd University of Petroleum & Minerals.

My heartfelt thanks and gratefulness are dedicated to my wife, daughter, cousins and parents for their constant prayer and support throughout my study and travel between the two cities. They are the source of persistence to complete my study.

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LIST OF ABBREVIATIONS

NAZAHA	Saudi Arabia's National Anti-Corruption Commission
SAGIA	Saudi Arabia General Investment Authority
ICE	Institution of Civil Engineers
ADR	Alternative Dispute Resolution
EPC	Engineering, Procurement and Construction
BOOT	Build, Own, Operate and Transfer Delivery
VAT	Value Added Tax
JV	Joint venture
ARCADIS	International consulting and management firm

ABSTRACT

Full Name : Salah Ibrahim Abdullah Habash
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Construction industry is a rich environment of disputes and conflicts, which increased proportionally in rate and cost with the development of the industry through years.

Researcher studied in this research the construction community in Riyadh, Saudi Arabia because of its massive construction market, and due to limitation of time and geographical access to owners and contractors. Due to the importance of the construction industry nowadays, and the big effect of disputes in projects quality, cost and completion time, researcher attempts to study the factors of disputes from the owners and contractors point of view, targeting the elite construction stakeholder and community, and filtering the most important and repeated factors that mostly causes the dispute, using basic statistical methods, testing the significant of these factors using the T-test, and the consistency of factors among all the classification of the participants, and segregating these factors from the perspective of the contractors and owners type, then the effectiveness of their usual practice to resolve the dispute, and finally propose a new approach of resolving the disputes in construction forever, by converting the type of contract between the contractor and the client to end up with a win to win contractual relationship till the end of the project.

Major factors of dispute found to be due to a contractual and finance factors, and the usual reaction is to mitigate the dispute, and negotiate the disputed work, which does not eliminate or prevent the dispute absolutely, but solves it once it appears.

ملخص الرسالة

الاسم الكامل: صلاح ابراهيم عبدالله حبش

عنوان الرسالة: النزاع و تحويل العقود المبنية على المبلغ الاجمالي المحدد مسبقا في المملكه العربيه السعوديه

التخصص: ادارة و هندسة الانشاءات

تاريخ الدرجة العلمية: June 2019

يعتبر القطاع الصناعي في البناء و الإنشاءات بيئة غنية بالنزاعات والخلافات والتي ازدات نسبة حصولها والتكلفة الناجمة عنها مع تطورهذه الصناعة عبر السنوات. في هذا البحث اختار الباحث أن يدرس قطاع صناعة الإنشاءات في مدينة الرياض،المملكة العربية السعودية، و ذلك لضخامة حجم سوق الإنشاء بها، و ايضا بسبب ضيق الوقت اللازم للوصول الجغرافي إلى المالكين والمقاولين.

نظرا لأهمية صناعة البناء او الإنشاء في الوقت الراهن، ونظرا للاثرالضخم للنزاعات على جودة المشاريع وتكلفتها والوقت اللازم لانهائها، فقد حاول الباحث دراسة معظم عوامل النزاعات من وجهة نظر مالكي و مقاولي المشروعات، مستهدفا النخبة من ممولي او المشاركين الرئيسيين في مشاريع البناء والإنشاء ، وتم التركيز على العوامل الأكثر أهمية وتكرارًا التي تسببت في النزاع في الغالب ، باستخدام الأساليب الإحصائية الأساسية ، ثم اختبار أهمية هذه العوامل باستخدام اختبار T ، ثم اختبار مدى توافق هذه العوامل بين جميع تصنيفات المشاركين ، وفرزهذه العوامل بحسب وجهة نظر المقاولين ووجهة نظرالمالكين بأنواعهم، ثم دراسة مدى كفائة ردود افعالهم المتخذة لحل النزاع، ثم في النهاية تم اقتراح نهجًا جديدًا لحل النزاعات في قطاع الإنشاءات بشكل جذري، عن طريق تحويل نوع العقد بين المقاول والعميل بطريقة تصل بالعلاقة التعاقدية حتى نهاية المشروع الى علاقة "فوز" الطرفين بشكل متساوي.

ان العوامل الرئيسية للنزاع عادة هي عوامل تعاقدية ومالية، ورد الفعل المعتاد تجاهها هوالتفاوض على العمل المتعلق بها و حلله بشكل ودي، مما قد لا يلغي حصول النزاع بشكل مطلق لكن يعالجه في حال أو حين حصوله.

CHAPTER ONE

INTRODUCTION

Construction has started along with human being existence in shelters and caves and evolved through life time until the present to constitute all the aspects of an industrial system regulated by law and management that governs allied relations among involved parties.

Construction industry could be defined as a combination of organizational resources gathered and utilized together to build something new. It is clustered into projects that have distinct life cycle, starting with an idea and progressing through design, engineering, and manufacturing [38]. Evidence developed along this process reveal in the rise-up of construction materials and building methods. It aims at fulfilling sophisticated human needs for security, aesthetic, and luxury.

The construction industry has markedly evolved and reached the level where it contributes to the total gross outcome representing around 6.35 percentage during the period (2011–2015) and expected to rise-up to 7.05 percentage in 2020, jumping from the value of US$105.6 billion in 2015 to US$148.5 billion in 2020 [16].

Construction industry in Saudi Arabia recruits around four million personnel from all specialty spectrums, interacting together in different projects to introduce the project deliverables, which makes the industry full of variables to be controlled properly toward the final products [32].

1.1 Statement of the Problem:

Factors affecting the construction industry must interact in a two-directional approach until the project deliveries, taking the considerations of all the disputes, requirements, changes, governing legislations, constraints, and financial funding to support all operations.

The factors affecting the construction industry could be divided into two main categories: internal factors, and external factors. Internal factors lay in the contractor resources, chosen construction method, financial funds, tools, labor, major change in design, and firm organization. Whereas external factors might include but not limited to unpredictable construction circumstances, changes in legislation, sudden inflation of prices, and riot. All these factors influence the project aspects, mainly the cost, project completion duration or due delivery date, and its final quality.

One of the factors that is related directly to the economic life cycle and affects any industry is the financial cost fluctuations, which harshly impact deliveries of the construction industry. An example in this regard, is the percentage of stumbled construction projects tracked by the Saudi Arabia's National Anti-Corruption Commission (Nazaha), which reported that 44% of construction projects have gone through unsurpassed obstacles and have stumbled as shown in **Figure 1.**

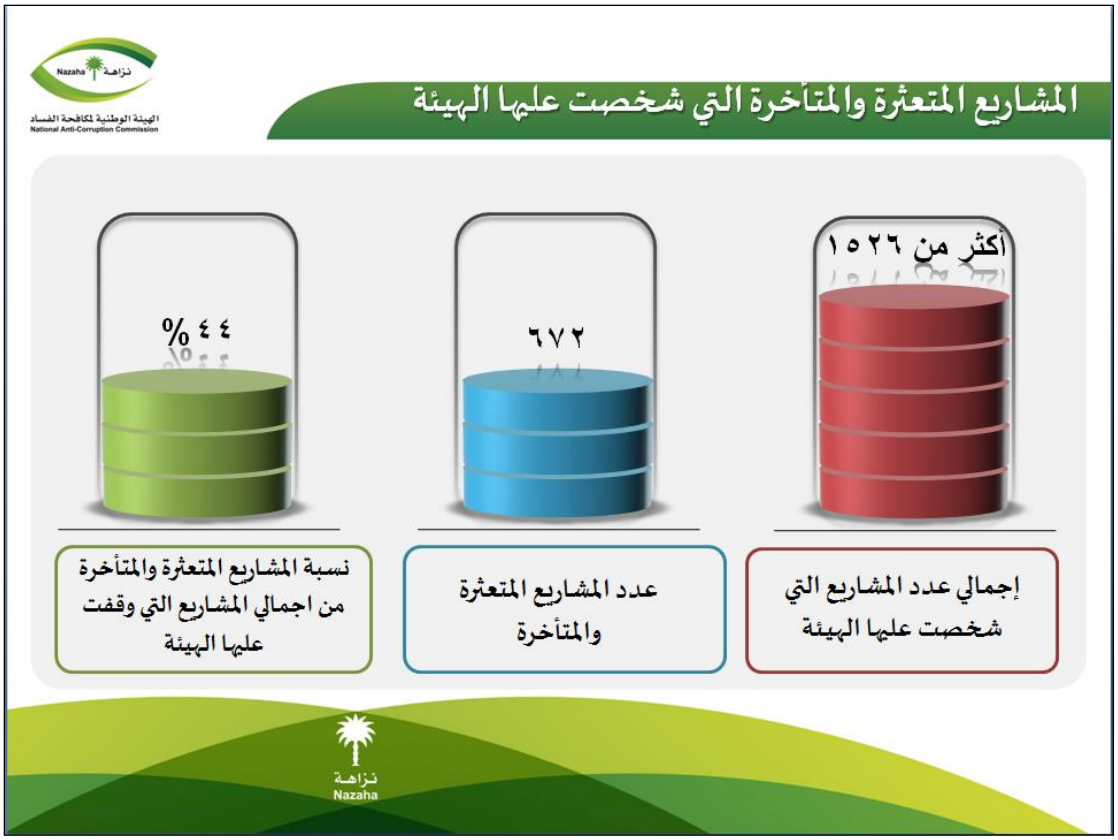


Figure 1. The Percentage of Total Unsurpassed Projects in Saudi Arabia According to NAZAHA [38]

There are reasons and obstacles that affect the performance of the project, in the initial stage such as the unclear boundary of the contract scope, shortness of time for setting project specifications, and the delay of handing over the project site to the contractor. However, obstacles during the execution stage include; the misinterpretation of the project specification, extensive division and awarding the same sub-contractors, weak technical and engineering supervision, massive changes in instructions and the jurisdiction mash-up among the involved parties, whereas in the handover stage any incomplete agreements in contractual documentation could affect the final delivery. Eventually, a force majeure during any of previously mentioned stages could delay or suspend the project delivery, and cost the owner more than the budget cost, not to

forget to mention mitigation, mediation or litigation costs that could be associated with the disputation solving [28].

Kickoff meeting between owner and contractor would establish the main points to overcome future disputes, but it cannot cover them completely. After both parties have set the plan and the schedule for the project and agree on financial cost and start the construction, if any disputes have not been cleared on a contractual fair basis, then it would affect the efficiency, quality, and most importantly the cost of the project, leading the project to face unsurpassed circumstances, stumbles, or even put to a halt.

This study is an attempt to add to the knowledge of construction industry and to study the reasons of construction dispute. The common reaction of the governmental, contractors and private owners in Riyadh, Saudi Arabia that would escalate the dispute to a situation that turns to be a conflict. Proposal of changing the type of contract as a solution for these disputes between the owner and the contractor without the need to refer to the legislation court, in addition to state a circumstances and state of conditions where changing the construction contract between the owner and the contractor would establish a win-to-win relation and avoid project delay is the researcher main addition to the knowledge of construction industry.

1.2 Objective of the Study

This study aims to study the common dispute factors between the owner and the contractor from a different perspective, the common reactions towards the occurring disputes and to introduce a new approach for solving the dispute by considering the conversion of contract.

1.3 Significant of the Study

Disputes are likely to happen between people because they have different points of views, and similarly, disputes could also happen among owners and contractors in the construction industry. The consequences of disputations in construction industry is very important as these disputes could be resolved immediately, mitigated, or litigated in extreme scenarios

The escalation of a dispute into a conflict affects the construction project progress cost, quality and outcome. It also prolongs the project execution period and might suspend the whole project for years. Determining the main causes of disputes would help the stakeholders to avoid it from the first place or negotiate and solve the dispute.

Figure (1) demonstrates that 40 % of construction projects unsurpassed in the governmental sector [38], and that also can be extended somehow to the private sector projects which have fallen in halt because of disputes between owners and the contractors [38].

The traditional methods for solving the disputes in the construction industry still valid, but the researcher proposes a new method for solving the dispute, which is changing the type of construction contract and payment terms associated with the contract, to avoid the contract opportunism, delay of the project, earning the return of investment at earliest, enhancing the efficiency and the profit, and finally sustaining a better relationship between all the contract parties [20].

1.4 Scope and Limitation

This thesis is limited to the following:

- To construction contractor in Riyadh, Saudi Arabia due to time and cost constraints.
- To first and second-Degree building contractors.
- To the reasons of dispute between the owner and the contractor, and the common adopted responses to solve these disputes.

CHAPTER 2

LITERATURE REVIEW

A construction contract is a legal document which delineates the responsibilities and the relationships of the contracting parties.

2.1 Types of Construction Contracts

There are several contract types. The following section describes the types of construction contracts and introduces their advantages and disadvantages.

a. Lump-sum Construction Contract: Used effectively for projects in which the owner has specified the desired quality and quantity, and the engineer has set the plans, specifications, and the drawings to a stage by which the contractor can estimate the items and component of the project. Any expansion of the project scope will follow the same quality and type of materials [23].

   The owners would limit the cost in this type of construction contracts to an agreed or settled price between himself and the contractor. The awarded contractor gets the job after negotiating all the bidders to the contract, and

comparing the bidding prices between them, and to the estimated price prepared by the engineer in the phase of designing the project.

The advantage of this type of construction contract is that the owner would know the final delivery or outcome of the project according to the designated specifications and the full time and cost of executing the project. A lump sum construction contract is simple to manage because it is familiar to most of the personnel in the construction industry and highly experienced [9, 10]. On the other hand, the disadvantage of this type of contacts is that the unforeseen conditions in the construction contract affect severely the outcome of the project, and most likely the risk will be the contractor sole responsibilities.

b. Unit Price Construction Contract: This type is used when the quality of the project is known but the final quantity is not known at the bidding stage of the project. This type of contract can be also named as unit-cost contracts. In such contract type's unit price is set for each measurable unit (e.g. cubic meter, linear meter). Unit price contracts used widely in heavy, and engineering constructions such as road operations, tunneling, transit facilities, and bridges [28].

The owner involvement in this type of contract is negligible, because the price is settled for each item before it is being installed and used in the project and any risk responsibility is shared between the owner and the contractor.

This type of contracts has legal and preparation notch that the contractor would submit unbalanced bidding which might lead to a front-loading project (the contractor receives large percentage of payment at earlier stage of the project, compared to a smaller portion work executed)[16].

c. Fixed Price with Incentive Construction Contracts: is the same as lump-sum construction contract but the difference is that the incentive is considered the contractor profit. This incentive is adjustable within the owner cost limit of the project if the contractor fulfills the agreed conditions during the execution of the project.

   The quality and quantity are pre-defined in the project, and the contractor cannot go for the ordinary lump-sum construction contract because the design very complicated or the project pricing is appealing [28].

   Fixed Price with Incentive Construction Contracts is the best to accelerate the rhythm of the project, because it motivates the contractor to complete the project earlier than the agreed deadline within the budget and target. Moreover, it possesses the same advantages and disadvantages of the lump-sum construction contract.

d. Fixed Price with Fixed Fee: is the type of construction contracts carried out between the owner and the contractor to execute the project according to the specified quality and quantity within the agreed deadline. In case of completing the project earlier or with less cost than the agreed target price; the contractor is rewarded with a fixed amount of money.

e. Cost-plus Construction Contract: is the construction contract that is based on two components, the first is the cost of the executed work and the second is the agreed profit margin.

The advantage of this type of construction contract is that it shows in detail the breakdown of cost components and shares not only the benefits, but also the risk [33].

On the other hand, the cost-plus type of construction contracts is not simple to manage, because it requires more expenses and efforts to manage the contract through the life of the project, which can be done either by third party or the owner. This leads to high interference of the owner in the project progress and financial expenditures, which complicates the project.

f. Guaranteed Maximum Price Construction Contract: is a sub-type of the cost-plus contract. However, in this type of contract the owner does not pay more than a certain agreed amount of money. The contractor might benefit from the saved cost or share it with the owner if it is stated in the contract.

   The profit is the agreed margin of the contract price. Involvement of owner in this case of construction contract deep in terms of contractor financial state. Risk is mainly the contractor responsibility. However, the owner in this type of construction contracts controls up to a certain limit the expenses, either directly or through a managing firm or a consultant.

In Saudi Arabia the contractors are of two types; Saudi contractors and foreign contractors. The foreign contractors must have a license from the Saudi Arabian general investment authority (SAGIA), then obtain a registration at the ministry of commerce and industry which legislates the frame of money transactions. This regulates the construction contractors that are liable to work in Saudi Arabia, which are basically the same [29].

In general, according to the public experienced standard contracts, the contractor cannot claim for:

- Indirect or consequential losses.
- Loss of profits and the project.
- Un-expected loss or uncertainty [29].

2.2 Definition of Dispute

Dispute in construction industry is similar to human nature of possible disagreeing with others point of views, approaches, or opinions. Keeping in mind that in construction industry disputes are strongly related to contractual obligations and its consequences are costs more.

The dispute is defined to be "a variety of problems that can be faced during the construction process" [8]. Longworth consulting defines the dispute to be "any matter or issue rising between the parties and that has not been resolved for 30 days or more"[38]. Conflict is "any divergence of interest, objectives or priorities between the individual, groups or organizations" according to Powell-Smith and Stephenson, which is usually confused with the dispute. The dispute is initial stage of a conflict.

Oxford dictionary for English defines the dispute as "heated contention, disagreement in which opposing views are held". The Institution of Civil Engineers (ICE) definition states that dispute occurs when one of the parties raises a claim and the other rejects it,

and the rejection is opposed with un-consent by the party that submitted the claim [38].

The national construction contracts and law survey concluded that the dispute frequency occurrence during the last year was at least once a month in 30 percent from the respondents. With this significant repetition of dispute frequency, most of the efforts are concentrated on resolving them rather than preventing the dispute from the first place [29].

Construction dispute costs a lot if it is not resolved in timely manner, and the cost lies in personnel, finance, and loss of opportunities. These costs can be classified into direct costs like attorney expenses, expert opinion and alternative dispute resolution costs, and in-direct costs like ruining business relationships, company resources which are assigned to resolve the disputes and loss of opportunities. Experts estimated the litigation costs at the United States annually 5$ billion for the last decade. [31]

Dispute could be single or multiple, complicated and gathered issues, due to the nature of contractual transactions between the owner and the contractor [23], and it could rise during the establishment of a contract, interpretation of the contract, breaching, termination and execution of the contract [8].

The primary cause of dispute in construction industry is the project uncertainty, high expectation of the owner contractual nature (including the financial matters) and lastly the opportunistic behavior of the contract parties. [38].

2.3 History of Dispute in Construction

It is common in construction industry solving a large percentage of disputes before they are escalated to a conflict which is difficult to solve. If the dispute reaches the conflict stage, then this would cause a delay in the project; spending more time to resolve. This affects the project cost and the contractor opportunity to gain and involve in new projects.

It is a common practice to try to solve disputes promptly by the following:

1. To involve relevant people who know the history of the project to solve the dispute.
2. To maintain the cash flow of the project within the limited budget and within the supply chain process.
3. Preserve the good relationship between the owner and the contractor and act according to the good intentions.
4. Keep the construction teams concentrating on delivery system and their main role, avoiding any distraction.
5. Avoid the aggregation of minimal disputes from growing to larger ones.[28]

And to resolve the disputes in their early stages, a set of dispute resolution method are stated that they are followed by the expertise. Development to these methods came up with alternative dispute resolution (ADR).

Economy is a major factor in construction disputes, because this industry is highly contributor to the total economy in last years. Economy started to recover after the market economy crash in 2008 but in a slow base, which puts more pressure on

construction industry, currency, natural resources, cash and hitting in front the delivery system of engineering, procurement and construction (EPC).

The average values of dispute costs are increasing, due to the sophistication of construction industry. This includes new products, methods, and requirements of the construction industry. Regular techniques for solving disputes did not shorten the average time needed to solve them **(Figure 2)**, which indicates that the limited success of using the old methods to resolve the disputes in earlier stages is not efficient and highlights the importance of developing alternative approaches, especially for disputes in huge valued projects.

REGION	DISPUTE VALUES (US$ MILLIONS)						LENGTH OF DISPUTE (MONTHS)					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
Middle East	56.3	112.5	65	40.9	76.7	82	8.3	9	14.6	13.9	15.1	15.2
Asia	64.5	53.1	39.7	41.9	85.6	67	11.4	12.4	14.3	14	12	19.5
North America	64.5	10.5	9	34.3	29.6	25	11.4	14.4	11.9	13.7	16.2	13.5
UK	7.5	10.2	27	27.9	27	25	6.8	8.7	12.9	7.9	10	10.7
Continental Europe	33.3	35.1	25	27.5	38.3	25	10	11.7	6	6.5	18	18.5
GLOBAL AVERAGE	**35.1**	**32.2**	**31.7**	**32.1**	**51**	**46**	**9.1**	**10.6**	**12.8**	**11.8**	**13.2**	**15.5**

FIGURE 2. Global Dispute Values and the time needed to solve them [38]
(Adopted from ARCADIS international report for construction dispute)

Reasons of dispute are classified according to their root of origin and their nature as listed in the below **Table (1):**

TABLE 1. The classification of different reasons of disputes according to different writers [40]

Al Momani [15]	Causes of delay: poor design, change orders, weather, site conditions, late delivery, economic conditions, and increase in quantity.
Alkass *et al.* [16]	Strikes, rework, poor organization, material shortage, equipment failure, change orders, act of God.
Bristow and Vasilopoulous [17]	Five areas unrealistic expectations: contract documents, communication lack of team spirit and change.
Colin *et al.*[18]	Six areas: payment, performance, delay, negligence, quality and administration.
Diekmann *et al.* [19]	Three areas: people, process and product.
Heath *et al.* [20]	Seven areas: contract terms, payment, variation, time nomination, re-nomination and information.
Hewit [21]	Six areas: change of scope change conditions, delay, disruption, acceleration and termination.
Kululanga *et al.* [22]	Four sources of dispute: (1) errors, defects and omissions in the contract documents, (2) underestimating the real cost of the project in the beginning, (3) changed conditions and (4) stakeholders involved in the project.
Madden [23]	Three categories: legal, technical and quantum.
Molenaar *et al.* [24]	Three categories: people issue, process issue and project issues.
Rhys Jones [25]	Ten areas: management, culture, communications, design, economics, tendering pressures, lay, unrealistic expectations, contracts and workmanship.
Semple *et al.* [26]	Four areas: acceleration, access, weather, and changes.
Sykes [27]	Two areas: misunderstandings and unpredictability.

Internationally, the main reason for disputes in construction industry, is the failure of managing the contracts, according to the below **Figure (3)** from ARCADIS. Despite the booming of construction industry, it is not paralleled with the education and training of the involved personnel, neglecting the managerial skills developments, leaving it to the experience that varies from one to another.

2015 RANK	CAUSE	2014 RANK
1	Failure to properly administer the contract	1
2	Poorly drafted or incomplete and unsubstantiated claims	2
3	Errors and/or omissions in the contract document	3
4	Incomplete design information or employer requirements (for Design and Build)	New
5	Employer/contractor/subcontractor failing to understand and/or comply with its contractual obligations	4

FIGURE 3. Global ranking for the main reasons causing disputes Adopted from ARCADIS international report for disputes [38]

Global trend for the Joint venture contractors (JV) awarded contracts is ending up with a dispute, due to un-clear contract conditions and undefined scope of the contract between the JV parties, this dispute percentage reaches to 25.5%. Like the middle east, this percentage rises up to 32.3% which is an abundant case, indicating the fragility of economic stability which driving the construction industry, the short-term planning of projects, lack of sustainable project.

The demand to organize the construction industry, fund restrictions and pressure on the infra-structure leads to more urgency to update the contract forms adding to it the flexibility to maneuver between them, which enhances the partnership concept between the owner and the contractor, and increases the usage of the build, own, operate and transfer delivery (BOOT) system of projects.

2.4 The Economic Trend That Impacts the Disputes

After the economic crisis in 2008, the recovery took place in the entire world in several aspects, where the recovery rate estimated to be 3.2. A setback occurred during the last two years lowers the recovery rate by 0.2% from what it was expected. Typically, the construction market needs more time to revert back to its normal state. However, the expectation of fast recovery increases the risks and creates more disputes and turbulence in terms of controlling the number of disputes.

Fluctuating the commodity and currency pricing have a great influence on the construction market, which affects directly the raw and basic component and vocabulary of the construction. This fluctuation increases the risks because of

uncertainty and increase of construction costs and disputes. This also reduces the profit margin for the contractor and can lead to a loss of profit.

The value of investment, delayed return on investment, transferring the capitals and depending on imported building material ends up somehow with market inflation, in addition to the imposed new taxation (Value added tax (VAT)).

Momentum of construction industry has been lost because of the economy situations, leading to suspension, termination, cancellation or re-designing of projects to adapt the new market situation. These economy circumstances heat up a furious competition between the contractors to bid on projects with the cost value, just to stay in business, which creates a rigid contract for any variations, modifications, omissions and opens the doors wide for disputes [38].

2.5 Dispute in Construction Industry

With today's complexity of life, high demand of inhabitations raised. The intersection of interests and disciplines between all the parties involved in construction industry, in addition to uncertainty of supplies creates a fertilized environment for conflict, which can lead to project failure, project delay, cost overrun, decreased productivity and loss of profit or business relationship [34].

The conflict in daily life is not avoidable indeed, but the difference is how it is being managed, whether it is solved and terminated shortly and promptly, or it is escalated to un-manageable level with further consequences.

Particularly, in construction industry, the nature of the conflict could be out of four main roots:

- Conflicts of managerial basis: occurs due to lack of documented workflow, controlled in a planned timeframe accompanied with wrong managerial decisions; which cause this type of conflicts.
- Conflicts of financial basis: This nature of dispute is mainly because of human nature seeking for profit. Any factors that affect the total gross monetary of project revert to this nature of dispute. Also, the contractor profit or increase in project cost can be considered as a financial conflict base.
- Conflict of construction basis: any low quality of workmanship, changing in construction method, delays in milestone causes a conflict in the construction due to the source of dynamic nature of construction industry.
- Conflict Of contractual source: the contractual wording and instruments are the source of these conflicts [26].

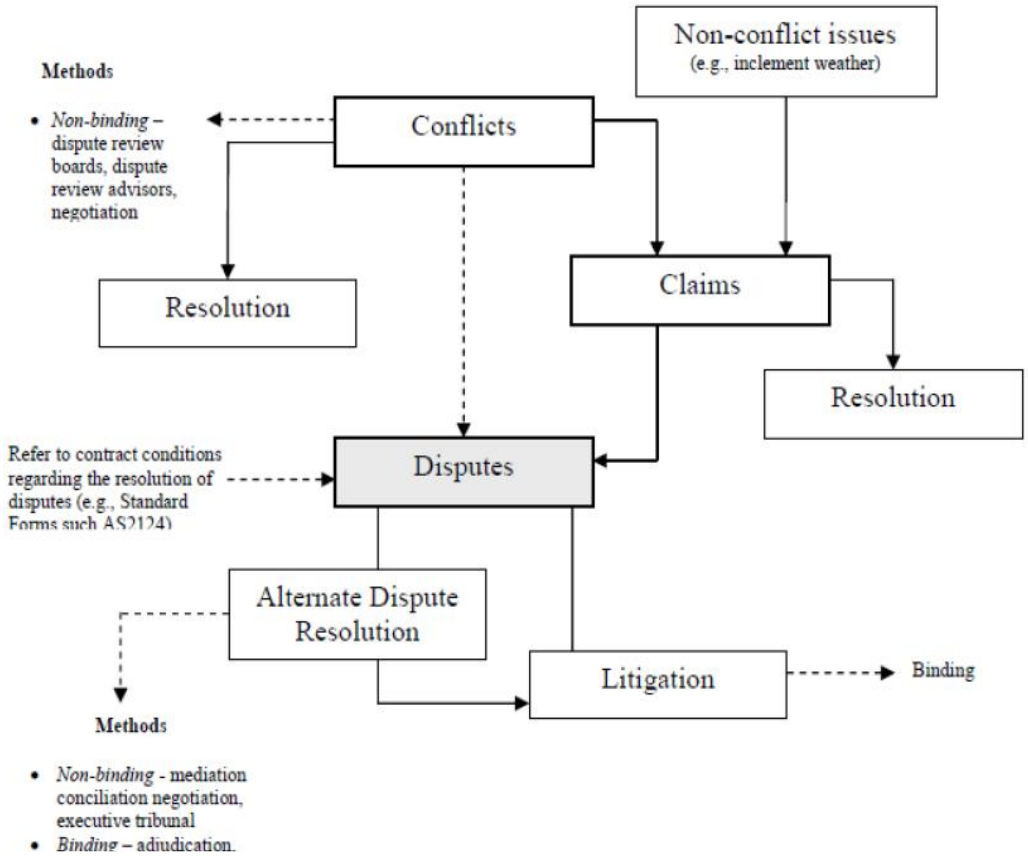


FIGURE 4. Process Chart for the Conflict in Construction [23]

TABLE 2. The usual source of dispute from the point of view of contractor, owner and consultant [38]

Variables	Indicators	Authors
Owner	Failure of respond to issues in a timely	Fenn, Lowe and Speck(1997)
	Lack of communication among the team members	Fenn, Lowe and Speck(1997
	The mechanism is not clear in providing information	Fenn, Lowe and Speck(1997
	Poor management, control and coordination	Fenn, Lowe and Speck(1997
Consultant	Failure of to determine responsibility in accordance with the contract	Hall(2002)
	Estimation error	Hall(2002)
	Delayed in providing information	Hall(2002)
	Design errors and specifications	Hall(2002)
	Pictures and specifications are incomplete	Hall(2002)
	Calculation of incorrect work progress	Kissiedu(2009)
	Lack of experience of consultants	Fenn, Lowe and Speck(1997
	Lack of contractor management, supervision, and coordination	Carmicheal(2002)
	Delay of jobs	Carmicheal(2002)
	Failure ofplan and implement change of work	Carmicheal(2002)
	The failure to understand the price of the work or the offer price correctly	Carmicheal(2002)
	Lack of understanding of the existing agreement in the contract	Carmicheal(2002)
Contracts and specifications	Employment contracts and the complete lack of construction documents	Poerdiyatmono (2007)
	The lack of clarity of document the distribution of workflow	Poerdiyatmono (2007)
	There is a confusing of terms in the contract documents	Poerdiyatmono (2007)
	There are terms that can cause a double meaning in the contract documents	Poerdiyatmono (2007)
	The big difference in understanding of contracts in foreign languages with the same contract and the Indonesian language	Poerdiyatmono (2007)

The reasons of disputes classified in **Table (2)** from the perspective of the consultant, contractor and owners, where it is obvious that there are different main reasons of dispute. Researcher through this study aims to unify the main reasons that affects the disputes in construction industry from the perspective of owners and contractors, by classifying the main reasons from the point of view of each category, then combine them all together statistically to get the most common reason behind disputes.

2.5.1 Causes of Contractual Dispute

The contractual is an agreement between the owner and contractor that defines the scope of work, time, payment terms, penalties, final deliveries, and the responsibility of both parties.

Recently, it is noticeable that most conflicts occur due to terms of contract which is not clear/ not mentioned/ incomplete/ divergence in the contract, which causes different interpretation by the contractor and the owner [26].

2015 RANK	CAUSE	2014 RANK
1	A failure to properly administer the contract	1
2	Poorly drafted or incomplete and unsubstantiated claims	2
3	Incomplete design information or employer requirements (for Design and Build)	New

FIGURE 5. Rank of the most common cause of dispute in Middle East region according to ARCADIS [38]

Reports of dispute generated by ARCADIS **Figure (5),** indicates that for the sixth year in a row, the failure in administering the contract is the main construction dispute factor between the construction parties including the contractor and the owner [38].

Construction industry disputes are increasing with time and complexity of project. In the meantime, the industry struggles to find more fast, economic options and solutions to resolve them. Managing the dispute should be part of project management to have a complete integrated solution of disputes, starting from prevention to innovative solutions [32].

Contract documentation and filing is part from the total contract agreement signed between the contractor and the owner. as a part from the contractual conflict happens due to payment terms are not clearness, overlooked conditions that it is referred to in the general conditions “boiler shell”, the country regulations, the higher jurisdiction authorities like the civil defense regulations, the contradiction between the details of these contract documents (like the general details and specification), un-controlled change in the scope through the change orders, any variation orders that exceeds the limit stated in the contract and difference in the stated site conditions that would go for a different construction method for example is a contractual conflict area.

Project specification governs the quality of the deliverables. Human nature could cause errors and mistakes at work which affects the contractor guidelines of project execution.

Obsoleteness of materials or product described in the project document can change the whole item in the project bill of quantity “BOQ”.

Lots of construction contracts forms are generated over years to avoid repeatable conflicts, but the application and tailoring of the standard contract is not literally applied in the construction contracts due to uniqueness of each project. The common

culture of the country, truncation mistake, and imposing the higher authorities' condition on the contractor is also apart from the forms of contractual disputes.

- Project Time Extension: The extension of time in projects is based on cases generated during the execution of the project, and in the case of un-proper arrangement of the documentation, which leads to a dispute between the contractor and the owner. Extension of time is associated with the revive of financial penalties on the contractor, and it extends the project duration, and increase the time span of the indirect cost on both parties.
- Availability of Information: the a of all the contract document, means there is no doubt, or any misinterpretation chance between the contractor and the owner. The best way to complete the project in a smooth way, within the time, budget and designated quality is the clearness of all the project aspects.
- Unrealistic Owner Expectation: Includes the un-realistic time schedule of the project, automation of the building, and the owner low budget for a sophisticated specification.
- Payment time: Contractor has a complete right to get profit at the end of the project, and accordingly the project bidding is generated with a profit margin, and contingency. Cash flow is prepared in consideration of all the factors that might affect the project including the funding of the project till the next payment is cashed, and if the payment is delayed by the owner then the contractor will end up funding the project from his own bank facilities, and loan money.
- Omission and Addition of Scope: Un-defined scope of the work, and any addition or omission of the scope would be followed by a variation order from

the contractor, and the dispute would occur in determining whether the item is included in the contract or not. [32].

- Un-awareness of General and Special Contract Conditions: Embedded costs can be spent to comply with the conditions of the contract that is why a special attention has to be paid to these conditions.
- Usage of Non-familiar Type of Construction Contract: Construction contract is well-known and familiar with definitions and terms used in the contract document is preferable for all parties. Special projects force the contract parties to have a hybrid type of contracts, or a new contract type that requires more effort form contract administrator, associated with extra cost. This type of hybrid contracts could initiate dispute between owner and contractor.
- Error in Contract Document: any error in contract document, such as the measurement units, would alter the final deliverables, and endanger the project by the dispute.
- Contradictions in Contract Documents: it confuses the contractor during the work and gives him the chance for disputing the owner regarding the specification of the project.
- Project Delivery System: the delivery package of construction, affects the cash-flow, and the construction methods to be chosen to complete the scope of work. But in the other hand it imposes a new set of factors that may cause the dispute.
- Joint venture (JV): the partnership between the contractors has advantages of handling super-sized projects that cannot be handled by a single contractor. On the opposite, it requires more efforts to administer the contract between the two parties and gives a chance for more dispute reasons.

2.5.2 Causes of Financial Dispute

Finance is major factor for dispute between the contractor and the owner, where the finance is the driving force of life, and the contractor is looking for profit. Accordingly, it is a vital and a critical reason for some dispute, which can mention for example:

- Un-balanced bidding: it is difficult to be pointed during bidding stage by un-experienced construction personnel, though it is important for the cash flow arrangement during the project. The un-balanced bidding gives the contractor a chance to raise claims, if there is an expectation of increased quantities of some item of work. This un-fair practice is not dealt with full attention by lots of owners or by owner representative during the bidding analysis and project awarding.
- Front loading: the situation happens when the contractor cashes most of the contract value at early stages of the project, ending up with no enough funding to complete the project. The owner secures usually the project completion with the same contractor by increasing the bank guarantee, which affects the owner and the contractor. Others suggests the partnership of the owner and the contractor to overcome this issue, and to build a sustainable relationship between them.
- Un-agreed Breakdown of the Lump-sum Items: In lump-sum contract the breakdown of the BOQ is used for the payment purposes, and to estimate the executed work. Accordingly, if the BOQ quantities do not match the site

quantities and it does not describe accurately the items, a dispute will arise between the contracting parties [16].

- Cash Flow Plan: Along with the project scheduling, and determination of the long lead items; a cash flow plan is determined and adjusted on a periodic bases to accommodate the unforeseen situations and adopt the crash tasks to compensate the delay in projects.
- Delay in Payments by the Owner: the payment for the executed work and the payment terms is determined in the contract between the owner and the contractor. Failure to comply the payment terms, slows down the momentum of the project cycle, and causes consequences in work completion.
- Variations and Additional Items: Improper design, lack of information and the difference in owner expectations from the design, raise additional items in the main scope of contractor. This variation is a fertilized environment for dispute.
- Wrong Project Estimation: during the bidding stage the mistakes in the take-off and reading the project documents as a complete package, leads to wrong project bidding. That mistake forces the contractor to cut the corners, and lowers the quality stated in the project specifications and general conditions of projects.

In addition to those reasons: securing project funding is a source for the financial dispute, which affects the progress and the pattern of the project that follow through difficulties and disputes. Eventually, loss of profit and in extreme situations the contract termination and bankruptcy occur.

2.5.3 Cause of Managerial Conflict

Contract, human resources, risk management, and all other managerial construction decisions affect the operations and the smooth execution of the project.

Quality control and assurance has a major role in omitting mistakes and controlling them. Changes that would occur during the construction processes, such as the cost controlling, allocating a specialist sub-contractor and qualifying them, qualifying the best, efficient management team and monitoring the management in timely manner, managing the correction is a recommended method to minimize the disputes. [26].

- The administration process: like the internal time frame for placing the order, securing the site stores, dispatching the material to the construction location, replying the correspondences, time frame of rectifying the nonconformance reports and removal of the un-approved/defected material from site are only an examples of activities that elongate the project life cycle, and consequently increases the indirect cost and other financial obligations, like penalties (creating more dispute between the owner and the contractor) [32].
- Response in timely manner: Delay in response causes severe delay in the tasks and activities, which delays the whole project.
- Failure of communication between the contractor and the owner: Agreement of the communication channels and time frame for each type of communication to be responded is necessary to avoid this type of disputes. Also, book keeping, and correspondences recordings have to be kept in an accessible, authorized classified manner for involved personnel from the owner and the contractor side to assist in opening channels clear of any disputes.

- Applying a realistic, economical schedule: weak project management leads the project to delay, and dispute between the owner and the contractor.
- Clear responsibilities and duties of the construction team: Integrity between all the construction team, with clear duties and responsibilities for each position in the project, eases the construction operations and avoid the gap between the departments. Any disputes may result from the tasks, will be covered by two different departments.

2.5.4 Causes of Construction Related Conflict

During the bidding stage the contractor chooses the construction method and the inspection test plans, along with the required method statement. During the construction those will serve as monitoring tools that assists the contractor in executing the project smoothly within the budget the time frame.

Deviation is expected in construction, and it cannot be considered errors unless it goes to a major re-work due to poor quality, or un-controlled changes beyond the normal human error. Errors alerts the construction to pay more attention to these details, bearing in mind the safety, quality, schedules of deliverables.

The deficiency in design is a major cause of dispute, where it is estimated to be the reason in 38% of the construction disputes [26], and the design deficiency can be accounted in the following:

- Subsurface problems: where up to date there is no accurate as-built drawing at the municipalities in Saudi Arabia reflecting the infra-structure services. Full condition of the sub-soil cannot be detected accurately in the site handing over

to contractors, only excavation can do. This is along with lots of unforeseen situations can arise, like rocks and ground water table.

- Risks: Risks lies in all un-known situations, and it is difficult to be quantified in some aspects, like the opportunity loss. Mistakes in accounting means more costs to overcome the delay in the project.
- The responding time frame: One of the causes of for the dispute between the owner and the contractor is the delay of responses, or the action/decisions to be followed by the contractor, which causes claim between the owner and the contractor.
- The general regulation of residency and importing of the workforce from outside the kingdom without proper preparation for local forces, increases the risks, add an extra cost to the project and lower the workmanship and quality of the deliverables. [26]
- Construction people behavior and reactions: construction industry stands on three main pillars, the workforce, the material and the design. Accordingly, people reaction and attitude vary depending on location of the job site, payment, motivation, and a lot of factors studied extensively in separate researches.
- Delay in handing over the job site to contractor: The owner responsibility to hand over the project site to the contractor, along with all his part of provisions and licenses to commence the construction directly without any delay.
- Holding a scope/project for a long period of time: when the awarded contractor bids on a project, he studied the project and price it based on today's pricing of manpower, tools and equipment. These elements pricing varies drastically in

case it is imported from outside the kingdom, and it is affected by the yearly inflation.

- Extensive out-sourcing: Contractor is obliged by the signed contract to fulfill the quality specified in the project, which is difficult to be managed in case of extensive out-sourcing. It is not a compulsory to have negative impact if a strict pre-qualification procedure is followed to approach the proper experienced sub-contractor.
- Expected weather conditions: Areas known of a certain weather conditions might affect the construction progress, cannot be considered as an obstacle to be claimed.
- Acceptance and re-inspection costs: protection of the executed work till the final handing over is the responsibility of the contractor, unless a partial benefit from the project is done by the owner prior the final handing over. Partial benefit of the project opens the chances to damages, then the dispute will occur in order to determine the damage scope, and cost. [33]
- Lack of qualified technicians at workforce market.

Construction industry is a competitive, sophisticated environment, and the participant in this field come from different levels of skills, educations, backgrounds, cultures, and knowledge, and they have to work all in the same project together toward the deliverables, which shows the vast point of views between them and creates the inevitable disputes [30].

At the end, disputes in construction are one of the reasons for declining the quality, efficiency and performance of projects, and it dos not only cause financial loss in the

field, but also smudges the long-term relationship between the parties, affect the total economy of the country, because it represents part of the total economy.

2.6 Dispute Avoidance

Main factors that help avoid disputes are the following:

1. Risk allocation and sharing: the behavior of the contractor in the projects, where the risks are shared between himself, owner and consultant changed drastically. This can be seen from the signs like envisaging and exaggerating the small issues, false alleged variation. This is all can be avoided by awarding a fair contract terms and conditions.
2. Facing and dealing with potential problems or claims at earliest: It is always advisable to communicate on regular basis with all contractor and owner regarding their concerns, solve concerns in a fair timely manner, to compensate any missed procedure leading to any consequences.
3. Realistic Evaluation for the impact of claim: Opportunism in contract to compensate losses, especially the unplanned errors, is common in disputes.
4. Education: With all the sophistication of construction, training and utilization of the documented managerial methods are still not adopted in all construction projects.
5. Early negotiation: communication and negotiation regarding the un-agreed points are the safest, quickest, and cheapest approach to avoid disputes.
6. Appropriate attitude and willingness to solve the dispute: prejudge prevents the parties in construction projects from compromising the dispute to a solution that satisfies all involved parties [24].

7. Preparation of accurate and proper contract documents: Any discrepancy in the contract documents ruins the relationship between the contractor and the owner. A win-to-win deal, with the lowest cost, highest quality, and the shortest time should be established.
8. Proper contract administration: the contract documentation, responses in a timely manner and all the related contract tasks highly contribute to dispute avoidance.
9. Clarifying any missing information and discrepancies in contract documents: Contract documents is the key player that the construction moves within, to fulfill the contractual obligations, and complete the deliverables, any missing or contradicting information cannot be left miss-interpretive, because the contractor might look at it from a different perspective than the owner does. [34].

The above mentioned points are the primary ones in order to avoid any disputes in projects, but other steps has to be taken care of as an integrated system in managing the project, such as monitoring the cost of each discipline, maintaining the quality of the workmanship to avoid the repetition of work and extra cost, monitoring the staff and labor behavior and attitude, resolving any factors that might negatively impact the production, motivating the team for better performance by incentives, reward and penalties system fairly designed to overcome any shortage of skilled technicians in labor market[26].

2.7 Common Responses toward Disputes

Owner and contractors in the construction industry have different perspectives in solving the dispute/conflicts; those solutions vary from least to highest cost and time consumption, and can be summarized as below:

1. Adjudication
2. Conciliation
3. Dispute resolution advisor
4. Expert resolution
5. Third party neutrals
6. Med/Arb (A combination of mediation and arbitration).
7. Court appointed masters
8. Ombudsman
9. Diwan Al- Madhalim
10. Executive tribunal
11. Shadow Mediation
12. Rent a Judge or Private judge
13. Hold the whole project
14. Hold the disputed scope of work
15. Re-negotiate the contract terms [33]

2.8 Contract Conversion Process

Converting the contract is a term usually offered when project is set with irregular outlined information and data, needs refining during the progress of the project. While the project progresses, a clearer scope of work and requirements are revealed more and more, which the prudent approach would tailor the project contract to meet the new defined project situation between the owner and the contractor. [23]

Generally, the approaches of converting the contract apply for all types of construction contracts. It can be applied in all projects for different purposes like avoiding the repetitive dispute between the owner and the contractor, and to refine the new project requirements after the omission and addition of the original scope with different conditions, or it can be used to improve the relationship between the owner and the contractor to satisfy them after the unforeseen site situation.

Financial and legal issues need to be considered during contract conversion, because the termination of an existing contract and initiation of a new one for the same project, implicate an executed work to the old contract, and define a new milestone leading to contract amendment with resultant legal and financial consequences.

The contract conversion must be under the concurrence of the owner and the contractor, because it is an obligatory commitment for both of them. Contract conversion terminates the current relation between the same contractor and the owner in the same project and initiates a new one that has legal and financial consequences, those consequences needs to be understood for both parties.

Researcher proposes the contract conversion as an alternative solution to dispute between the owner and the contractor and an option for the non-solved disputes.

In order to go through these steps of converting the construction contract type from one type to another, there are multiple reasons to do so like internal or external reasons, these reasons vary from external source such as the force majeure, to the internal situations like overrun of budget, and massive change orders.

Approach of converting the type of contract between the contractor and the owner in the same project after a certain milestone of project progress is a new principle. Contract conversion is not practiced neither legally nor widely, that is why it is one of the main interest in this study (to simplify and introduce the construction industry), and it is one of the aims of this study is to standardize the best circumstances in project to change the type of the project.

The contract convertibility approach would lay financial and legal consequences, because it is not well-established and known to the construction industry in Saudi Arabia. This research targets the construction industry with its benefits and spot the situations where it is preferable to go for the construction contract conversion option, which is abiding the legislations and laws, helping the contractor and owner in consigns to have a win-to-win relation and overcome the dispute.

2.9 Main Steps in Contract Conversion

Contract conversion goes through multiple steps, studied carefully by the contractor and the owner, and the study goes from the top management to the site, including the breakdown of the activities, re-scheduling them, estimating them according to the new contract, evaluating the required manpower and costs for the new contract like changing the fixed costs and variable costs with all financial funder of the project.

The process of the contract conversion can be summarized as following:

- Calculation of the optimistic, pessimistic, and most likely cost for the current contract.
- Calculation of the same for the new contract.
- Calculation of the variance in cost between the two aforementioned costs.
- Converting two values of cost to the present worth of money.
- Finding out the convertibility value from the two sets of costs leading to an expected value and variance of the present worth value.
- Finally, the negotiation between the contractor and the private owner takes place to share the cost of conversion and finalize the legal contractual matter, defining the old scope, and how to terminate it and initiate the new contract [23].

CHAPTER 3

RESEARCH METHODOLOGY

This chapter presents the steps that were taken to achieve the objective of this study. The required data, data collection, data source, and data analysis are presented in the following sections.

3.1 Required Data

The data gathered in this research are the raw information that are scientifically and logically analyzed to understand what are the main reasons for disputes in construction, best practical manner to resolve them, prevent them from the first place, and finally conclude the main findings and recommendations to enhance the construction industry in Saudi Arabia.

The data needed to study the reasons of construction contract dispute, the usual reaction toward the disputes, and the knowledge acquired/practiced in changing the contract as an option/solution to solve the dispute are:

- Main reasons for the project dispute from the point view of contractor and of the owner.

- Parities' reactions and solutions to encounter dispute.

- Practice of contract conversion as an option to dispute solution.

3.2 Data Collection

The required data were collected from top management of contractors, private owners and governmental ministries, who are considered the experienced and referenced personnel in the field, through three sets of structured questionnaires, consist mainly:

Section 1 contains questions seeking personal data of the respondent, to verify the credibility of the provided responses, including the followings:

a. The highest level or Degree of education he holds

b. Position in the firm

c. Number of years in the position

d. Experience in the construction industry as measured by the number of years in the industry.

e. Experience in preparing and administrating construction contracts.

f. Type of firm (private or Governmental sector).

g. Number of contracts awarded/secured annually.

h. Size of work awarded/secured annually.

i. Type of contracts used.

Section 2 presents' the potential reasons of dispute and unsurpassed in the project from his/her point of view, by providing the respondents with a multiple reasons proposed by the researcher, and opening the chance for responder to add any reason from his/her point of view and justifying the reason why he/she thinks that this reason is an influencing factor in the dispute in the construction industry.

Section 3 introduces the principles of changing the contract, and questions the experiments of him/her if changing the contract has gone through it.

A copy of the questionnaires appears in Appendix B.

Data collection method was done by the following steps:

- Phone interviewing.
- By email
- Reviewing official reports from Governmental organizations.
- Reviewing previous official performance reports executed by contractors in the field
- Direct interview which assist the researcher to obtain more credible and valid replies and explore more options that the respondent could offer to the asked questions. This way was the best chosen by the researcher because it gives him the opportunity to launch the beta questionnaire and improve the choices of disputes encountered by the experiment community.

3.3 Population and Sample Size

The total of private contractors which are classified in the building sector as first and second-Degree contractors, are shown in the appendix "A", is 87 as first Degrees, and 65 as second-Degree contractors.

There is no well known list of owners to define the owner population. Therefore, a list of repetitive builders was generated including 34 government ministries and 45 private owners.

The population sizes of both categories are considered small, therefore, all the contractors and owners were contacted and invited to participate in the study, which increases the authenticity and omit as possible the bias from the research.

The study focuses in the first and second-Degree contractors in Riyadh, Saudi Arabia, because they are well-established, larger and most of the construction companies have their headquarters in the capital (Riyadh). It is also worth to highlight to the reader here that due to geographical constrains of the researcher the study is limited to Riyadh city only.

3.4 Data Analysis

To analyze the collected data from the questionnaire and get the results that would be translated to a meaningful outcome, researcher used multiple statistical, logical and experimental techniques that differ from previous studies in the analysis of data. This

study combines all the data information into coherent analysis, ended with specific findings and recommendations.

Data analysis was done starting by utilizing the simple statistics in an integral method, to convert the information into quantities that can be studied and understood using Lickert scale from (1 – 5). Incorporating the average of the weighted responses, the significance value (that was chosen to do the sample test of the mean the cut-off point for 5-point scale was set to "3.0" ($\mu = 3.0$)) to identify the weighted reason that would be moved to the next step in the analysis and research. Cronbach's coefficient alpha for the consistency factors of all the data and examining the distribution of data from all the respondents are methods used in the data analysis to eliminate the bias and odd responses and concentrate the focused studies on the highly repeated reasons of disputes [34]. The study of factors extent to all types of respondents (governmental ministries, private owners and the contractors) is done by experimenting the validity of the hypothesis assumed at the earlier steps of this study by picking the high averaged weighted reasons to be significant factors of dispute. The middle point of a 1 to 5 scale on the selected scale is 3, which represents the 50% of the respondents agreeing on the dispute reason to be important from their point of view; to the end the set value is higher than the middle point. Thus, the rationale and explanation of the null hypothesis is that the reason of dispute has a significant effect; whereas alternative hypothesis is that the reason is not significant and is not affecting the result of the study [18, 29].

Researcher also tabulated and graphed the responses in a simple data representation with the help of MS-Excel and SPSS software, to study the main reasons of contract dispute, the usual reaction to them and the contract conversion approach as an alternative dispute solution.

Analytic and scientific approaches in studying the information, followed by the documentation of all the information and data resources are systemized in the whole study to authenticate the data, adding credibility, practicality to the study results and explain the reader the method followed by the researcher in the is study giving him a better chance for better understanding and opportunity for further continuation of study. Outputs of this study are applied in construction industry, adding knowledge to the avoidance of dispute, possible dispute solutions and to train the experts in field on the latest methods that can be followed in this career.

CHAPTER 4

RESULT ANALYSIS

In this chapter researcher presents and discusses the analysis of the results from the collected data. The following section presents the characteristics of the respondents, the causes of dispute and the usual reaction toward disputes. A complete section at the end of this chapter has been dedicated to finalize the concept of contract conversion as a solution to disputes.

4.1 Characteristics of the participants

Bearing in mind the nature and scope of our study, the developed and constructed questionnaire was delivered to the 155 construction companies (contractors) on October 2017, whom are classified as first and second degree by the Saudi Ministry of Municipal and Rural Affairs and their head offices are located in Riyadh city. The questionnaire was sent also to 34 Governmental and 45 private owners who are to the best to our knowledge constituting the total repetitive builders in Riyadh city. **Table 3.** Presents the number of contractors and owners who were invited to participate in the study and the number of respondents to the questionnaire.

Table 3. Contacted and Responded Owners and Contractors

	Owners			Contractors			Grand total
	Governmental	**Private**	**Total**	**First Degree**	**Second Degree**	**Total**	
Contacted	34	45	79	87	68	155	234
Responded	34	20	54	62	68	130	184
Response Rate	100%	44.40%	68.35%	71.30%	100%	83.87%	

As shown in **Table 3.** The total number of owners and contractors whom contacted to the questionnaire is 234, but only 184 were considered valid because they were complete, valid and considerable to the statistics considerations. Therefore, the response rate for the survey was almost 83% which could be excellent representation for the population.

The selected respondent as a community for this study are the experts in the construction industry, with high education level as minimum as a bachelor Degree, and experience in the field mostly from 10 to 20 years, representing construction managers, decision makers and leaders, who had executed from 5 to 10 projects in the last ten years, to ensure credibility and accuracy of data out of scientific base.

All of these characteristics of the respondents are gives an indication of the Saudi construction industry status, and how mature they are in terms of dealing with the disputes and resolving them.

4.1.1 Characteristics of Participating Contractors

This section demonstrates the selection criteria of the participants that are the sources of the study information, in order to show the highly sophisticated personnel involved in the research, and chosen by the researcher to participate in a study that could be

considered as a reference in future. The characteristics of the participating contractors and owners will be presented in the following subsections.

The participated contractors are from first and second-Degree contractor, classified according to the ministry of Municipal and Rural Affairs, whom considered the most reputable contractors in the construction market. Construction trend and industry rendered after their influence of the projects with their qualified personnel.

The chosen contractors represent the most ranked and sophisticated contractors based on the size of their projects, cumulative experience, capital, assets, the internal organization system, type of owned projects, type of construction contracts they have experienced, and the total experience of personnel hired in the company.

All the above specified in the developed policies and regulations to organize construction of the projects, by deploying the built experiences thorough the long-term years of effective participation in the construction and contracting industry, and the methods used to overcome the disputes during the executed projects.

The respondents from the contractor side represents the elite of all the construction community, and prestigious ranks among the whole community, whose career in construction develops Saudi Arabia via the infra-structures, engineering projects, industrial projects and the mixed-use projects.

All the respondents from the contractors are senior personnel, their expertise was reflected on the level of education, occupied positions, their roles in construction industry, number of years of experience and number of completed projects in the last 10 years have fruitful influence on construction industry, and include wide spectrum of multiple backgrounds out of facilities they have worked with.

The results indicated that the respondents are highly educated with at least a bachelor's Degree in various engineering disciplines. Very-good percentage (13.08%) of those respondents holds master's Degree and about 2.31% of them hold Ph.D. The participants' educational distribution is presented in **(Table 4).** It is believed that this high level of education will contribute to the reliability and credibility of the collected data. It is believed that the respondents have appreciated the study objectives and understood the questionnaire contents and, hence, provided high-quality data with assistance of their high education.

TABLE 4. Education level of contractor's respondents

Level of education	Number of respondents	Percent (%)
Bachelor's Degree	110	84.62
Master's Degree	17	13.08
PhD	3	2.31
Others	0	0.00
Total	130.00	100.00

The level of education between the first Degree and second-Degree contractors are listed in the below two tables **(TABLES 5 and 6):**

TABLE 5. First Degree contractor educational level

Educational Level	Number of respondents	Percent (%)
Bachelor Degree	49	79.03
Master Degree	10	16.13
PhD	3	4.84
Others	0	0.00
Total	62.00	100.00

TABLE 6. Second degree contractor educational level

Educational Level	Number of respondents	Percent (%)
Bachelor degree	61	92.42
Master degree	5	7.58
PhD	0	0.00
Others	0	0.00
Total	66.00	100.00

By the comparison between the first and second-Degree contractors, it is obvious that the first-Degree contractors are hiring more educated personnel, capable of handling construction, and contractual issues more than the second-Degree contractors. Only PhD holders are working for the first-Degree contractors. Beside that this is also one of the conditions to classify and rank the contractor it also affects the type and size of projects the contractor is qualified to carry on based on his previous executed projects.

High percentage of 43.84% of the respondents are occupying construction manager position for the highest need of this position in construction as they are on the fields coordinating and harmonizing the tasks in progress, on the other hand 22.31% Even in a higher positions like project manager position, and this lower percentage can be justified by understanding that the project management is nearer to the top of the herachary of construction and avoidance of conflict of decision is the aim, 6.15% occupying a general manager position, and the same in occupying general director position. Those are the main executive positions in companies to run the firms effectively.

Supplementary positions like architects represent a 6.92% from the respondents. 10% work in cost manager position, thus possess a financial point of view in disputes, and the remaining 4.62% occupying other positions like legal advisor and maintenance manager. The participants' job title distribution is presented in **(Figure 6).** It is

authenticated that these positions in the contractor's firms are not occupied by any personnel unless he is well-qualified, expert and educated. These qualifications of the position holder ensure study integrity and credibility. These characteristics of the job title or positions emphasize more accurate and feasible data used for the benefit of the study.

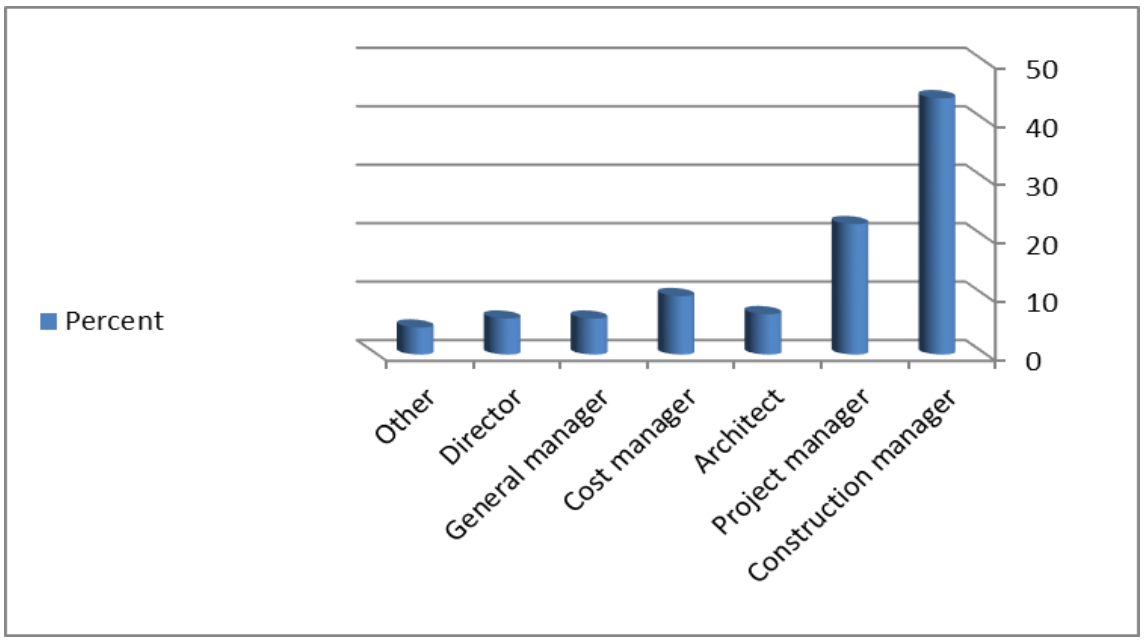


FIGURE 6. Respondents Contractors Job Title

Out of the first-Degree contractors **(Table 7)**, 43.55% were construction managers, 24.19% were project managers, 9.68% were architects, 8.06% were cost managers, 6.45% were general managers, 6.45% were directors, and the remaining occupy different positions. This reflects the maturity of the first-Degree contractors, functionality and practicality in assigning the positions. Number of architectures in first Degree contractors gives an indication for the integrity among different departments, and the generation of workable solution in-house.

TABLE 7. The first-Degree contractors respondents job title

Job title	Number of respondents	Percent (%)
Construction manager	27	43.55
Project manager	15	24.19
Architect	6	9.68
Cost manager	5	8.06
General manager	4	6.45
Director	4	6.45
Other	1	1.61
Total	62	100

Out of the respondents from the second-Degree contractors **(Table 8)** 44.12% were construction managers, 20.59% project managers, 4.41% were architects, 11.76% were cost managers, 5.88% were general managers, 5.88% were directors, and the remaining occupy different positions such as legal advisors, accountants and operation directors.

TABLE 8. The second-Degree contractors respondents job title

Job title	Number of respondents	Percent (%)
Construction manager	30	44.12
Project manager	14	20.59
Architect	3	4.41
Cost manager	8	11.76
General manager	4	5.88
Director	4	5.88
Other	5	7.35
Total	68	100

The second-Degree contractors seem to rely on engineers, which gives an advantage of more comprehensive integrated solutions, one contact point, and faster solution to the day to day coordination and problem solving. On the other hand, the architectural engineers in second Degree contractors may be relied on in out-sourcing. For the importance of the cost and finance, the same percentage of cost managers is assigned in both Degree contractors.

Respondents with their positions and educations are influencing the construction industry through their positions. Highest positions are occupied by them starting from project director to a construction manager (positions filled usually in the well-organized contracting firms, after certain years of experience, basic education level, and multi training and courses) and who are deeply involved in construction industry. Obtaining the required data from such individuals add more reliability to the study findings.

From below (**Table.9**), 85.83% are a decision maker in the companies where they are working, 3.85% works as advisory to the management or the dispute solving board,

3.08% work as assessors to the company treasury and the financial situation, the remaining 7.69% work in different positions like coordinators, and board member.

This reflects the depth of the influence of their role in the construction, shaping and directing the firm and industry by the decisions they take, and controlling the construction by assessing the processes, or possess combined role of both assessment and advisory.

Significance of their role in the study comes out from their recommendations, decisions, and advisement to determine the important factors of disputes, and the reaction towards the dispute, and if they would consider the conversion of contract to resolve the dispute or not.

TABLE 9. The role of respondents in construction from the contractor respondents

Role	Number of respondents	Percent (%)
Decision maker	111	85.38
Advisory	5	3.85
Assessment	4	3.08
Others	10	7.69
Total	130	100

First Degree contractors are more organized companies, and it looks that they are more practical, non-centralized managing style, relies on the participation of each position in the whole organization.

Percent of the decision makers in first Degree contractors (**Table 10)** is 85.5% revealing that the respondents are mostly affecting the industry by their decisions, and the 6.45% advisory who recommend the actions to be taken, and 1.61% of the respondents were assessors, while the remaining 6.45% occupy different positions like

legal and contract and commercial managers to reflect the whole process point of view in the study objectives, and increase the confidence in the outputs of the study.

TABLE 10. First Degree contractors respondents role in the construction

Role	Number of respondents	Percent (%)
Decision maker	53	85.48
Advisory	4	6.45
Assessment	1	1.61
Others	4	6.45
Total	62	100

Results indicate **(Table 11)** that 85.29% from the respondents of the second Degree contractors are decision makers, which is the same percentage almost in the first Degree contractors, and 1.47% are advisory indicating the lack of assigned personnel to advise the board on complicated contractual and construction issues, but the percentage of the assessor review the actions taken is 4.41%, which is more than the first Degree contractors, which indicates that for the adopt management way of assessing every activities by the doer, and the quality control department in the first Degree contractors, and the remaining 8.82% occupying different positions in the organization like financial officer.

TABLE 11. Second Degree contractors respondents role in the construction

Role	Number of respondents	Percent (%)
Decision maker	58	85.29
Advisory	1	1.47
Assessment	3	4.41
Others	6	8.82
Total	68	100

Respondents replies conveyed the high experience they possess **(Table 12),** where only 1.54% of the respondents have an experience less than 5 years, around 1/3 of the respondents have an experience from 5 to 10 years ranking them in a construction manager positions in the firms, and the average of the respondents from all the contractors have experience from 10 to 20 years , where half of the respondents have high experience in the construction field, and the remaining 17.69% have experience longer than 20 years.

Experience in construction shapes more and more the practice and improves it. Contractors are taking the best action to resolve disputes with more confidence and lead the projects with their personnel for the benefit of all stakeholders of the project.

The respondents have all the required education and experience to practice the contract administration in expert levels, and to run super-sized projects with persistence to success, and this experience is what it is scoped in our study to evaluate the reasons of dispute and the reactions toward construction dispute.

TABLE 12. Experience of respondents from the contractor in construction

Period	Number of respondents	Percent (%)
Less than 5 years	2	1.54
5 to less than 10 years	44	33.85
10 to less than 20 years	61	46.92
20 years and more	23	17.69
Total	130	100

First Degree contractors depends on highly-experienced and practiced personnel **(Table 13),** with more than 10 years of an experience (percentage of 61.29%), and none of them have experience less than 5 years in the higher positions, and only 19.35% have experience between 5 to 10 years, and the same percentage of 19.35% have experience more than 20 years as shown in t below table, proving that they are experts in their field, whose their opinions are considered to be closest to the truth.

Table 13. First Degree contractors respondents experience distribution

Period	Number of respondents	Percent (%)
Less than 5 years	0	0
5 to less than 10 years	12	19.35
10 to less than 20 years	38	61.29
20 years and more	12	19.35
Total	62	100

While the second Degree contractors **(Table 14)** are depending on personnel who have experience between 5 to 10 years with a very good percentage of 47.06%, best suited for construction management (positions occupied by the second Degree contractor), and 33.82% of the respondents from second Degree contractors have experience from 10 to 20 years and that is the positions filled by general managers and cost manager class of employees, 2.94% have experience less than 5 years and those are the personnel who are perhaps running family business, and the remaining 16.18% have experience more than 20 years who are the directors.

TABLE 14. Second Degree contractors respondents experience distribution

Period	Number of respondents	Percent (%)
Less than 5 years	2	2.94
5 to less than 10 years	32	47.06
10 to less than 20 years	23	33.82
20 years and more	11	16.18
Total	68	100

Requirements of the municipal and rural affairs specifies a mandatory minimum number of engineers with pre-determined number of experiences, which justifies the difference in experienced personnel between the first and second-Degree contractors as shown.

First and second-Degree contractors are the elite contractors, who are awarded the biggest projects, indicated by the number of projects participated in during the last 10 years, and the cumulative built experience.

Contractors finalized 5 to 10 projects in general during the last 10 years, which is a huge momentum built through cumulative experience, reached 53.08%, and a very good percent of them (30%) completed from 10 to 20 projects during the last ten years. More than 20 project completion during the last ten years is a major accomplishment that should be respected by 15.38% for the contractors, and the remaining 1.54% completed less than 5 projects (**Table 15).**

TABLE 15. Respondents completed projects from the contractor

Projects	Number of respondents	Percent (%)
Less than 5 projects	2	1.54
5 to less than 10 projects	69	53.08
10 to less than 20 projects	39	30
20 projects and more	20	15.38
Total	130	100

Distribution of the first-Degree contractors of the projects is 51.61% turnover from 10 to 20 projects during the last 10 years, with high value of medium to large projects. Moreover, 25.81% completed 5 to 10 projects due to instability of construction industry because of the new regulation and the economic situation of raw material and manpower in the market. In 22.58% turnover more than 20 project during the last 10 years, who are international contractors and the largest contractors in Saudi Arabia as shown in **Table 16.**

TABLE 16. First Degree contractors project participation last 10 years

Projects	Number of respondents	Percent (%)
Less than 5 projects	0	0
5 to less than 10 projects	16	25.81
10 to less than 20 projects	32	51.61
20 projects and more	14	22.58
Total	62	100

Second Degree contractors participate in less budgeted projects than the first-Degree contractors. Five to ten projects during the last 10 years were completed with a percentage of 77.94% which might be due to financial limitations as in (**Table 17).**

A percentage of 2.94 participated in less than 5 projects which are not well-organized and were exposed to lack of financial fund. A percentage of 10.29 participated in 10 to 20 projects during the last 10 years who are the top class of the second-Degree contractor. A percentage of 8.82 completed more than 20 projects which might be due to shortage of the assets to work in parallel in more than two projects.

TABLE 17. Second Degree contractors project participation last 10 years

Projects	Number of respondents	Percent (%)
Less than 5 projects	2	2.94
5 to less than 10 projects	53	77.94
10 to less than 20 projects	7	10.29
20 projects and more	6	8.82
Total	68	100

Construction market for years in Saudi Arabia relied solely on national contractors, but this situation has changed during the last few decades with importing the experiences to Saudi and mixing them with the international contractors. Investment regulation did not open the doors widely to the international contractors without any limitations, but it was regulated through the SAGIA to protect mainly the local contractor.

This stand changed with Saudi vision 2030, allowing the self-control of the market and investors' attraction to invest around 8 trillion SAR in all the 8 sectors announced including the construction.

The contractor employer percentages are 84.6% national, and 15.3% international among all the first and second-Degree contractors as shown in **(Figure 7)** and **(Table 18).**

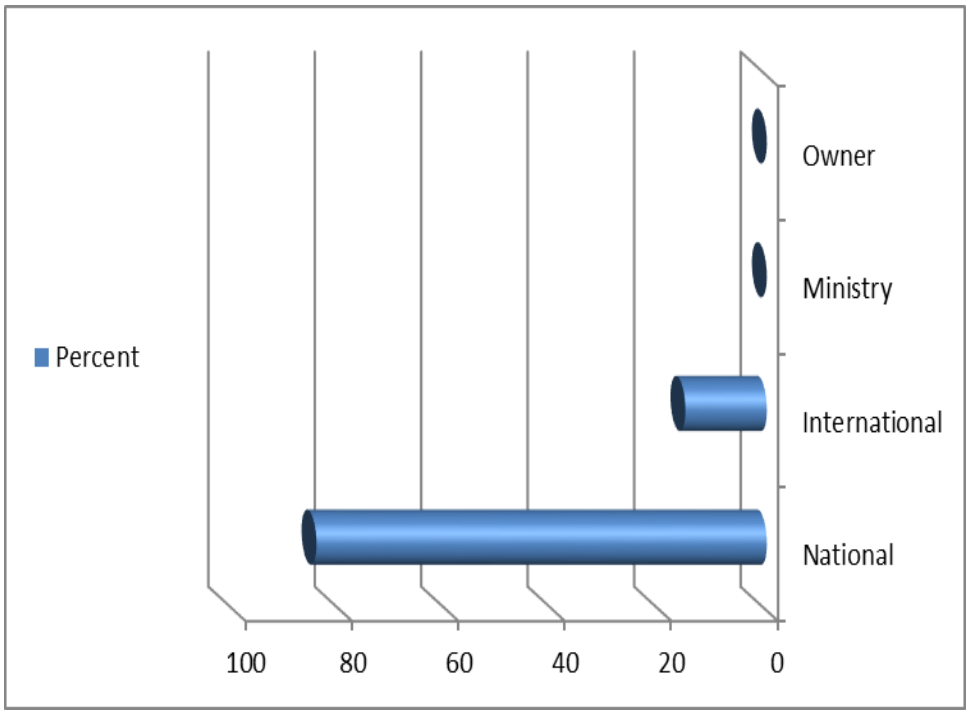


FIGURE 7. Nationality of the contractor employer

International first-Degree contractors represent 19.35% out of all first-Degree contractors, because the investment organization regulations requires to have only highly qualified contractors, and they might be ranked as a second Degree in other field of construction rather than the scope of the study as shown in (**Table 18).**

TABLE 18. First Degree contractors according to the nationality of the employer

Nationality	Number of respondents	Percent (%)
National	50	80.65
International	12	19.35
Total	62	100

Remaining first Degree contractors are national companies with a percentage of 80.65% from the total respondents which indicates that most of the first-Degree contractors are familiar with the construction industry market.

Second Degree contractors include 8.82% of international employer compared to a percentage of 91.18% for the national contractor. This reflects that the international contractor's presence in the construction industry market in Saudi Arabia is highly restricted and not open to the weak contractors as shown in (**Table 19).**

TABLE 19. Second Degree contractors according to the nationality of the

Nationality	Number of respondents	Percent (%)
National	62	91.18
International	6	8.82
Total	68	100

Moreover, we clarify the size of the private and governmental sectors participating in construction industry and how these percentages influenced the significance of the participants in our study.

As shown below in (**Figure 8**) shows that the participated contractors have executed 4.6% governmental projects, whereas 93% were private projects, and the remaining 2.3% projects were executed by others like re-innovation. This indicates that the private sector is the key player and the driving force for the construction industry, and that most of projects covered in our study area and scope are the owned by the private sector.

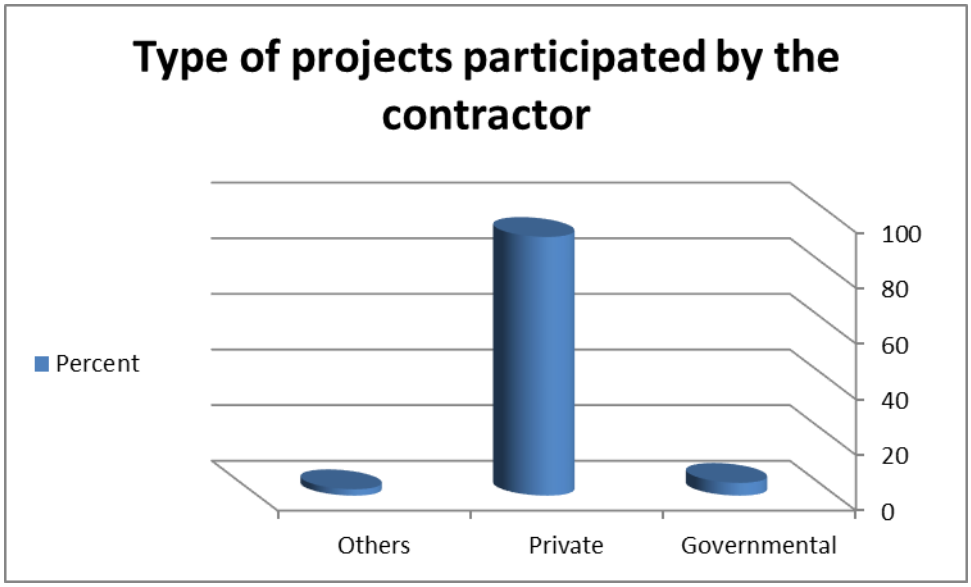


FIGURE 8. Contractor's type of projects participated in construction in Saudi Arabia

Now looking into the two classifications of the contractors; who are the dominant in the acquisition of the projects?

It is found that the first-Degree contractors executed the projects owned by the private sector in a percentage of 90.32%, indicating that private owners look for first Degree contractors to execute their projects because of their competency, and the built trust through cumulative experience and reputation as shown in (**Table 20).**

Only 9.68% projects were owned by governmental sector, and no other projects were owned by another side.

TABLE 20. First Degree distribution of project's owners

Type of projects	Number of respondents	Percent (%)
Governmental	6	9.68
Private	56	90.32
Others	0	0
Total	62	100

It might be that second-Degree contractors tend to execute the same type of projects with a percentage of 95.59% for the private owners, due to relatively quicker in paying/cashing the contractor certified invoices than the governmental ministries as shown in (**Table 21).**

No governmental projects executed by the second-Degree contractors that might be due to lack of trust between the governmental ministries and the second-Degree contractors.

Finally, only 4.41% from the respondents of second Degree contractors executed other type of projects like the innovation of buildings.

TABLE 21. second Degree contractor's distribution of project's owners

Type of projects	Number of respondents	Percent (%)
Governmental	0	0
Private	65	95.59
Others	3	4.41
Total	68	100

As we move forward in our study, it is questioned if there is any dispute in this construction industry market and wither the objective and the hypothesized assumptions in this study is valid. Accordingly, this question is directed to the community sample.

Answers indicated that the construction industry took the dispute render, which is prevailed from the frequency of dispute stated by the contractors are majority and most of the respondents replied dispute frequency from two to three times a month with a percent of 60%.

Another 13.08% stated in the survey that the frequency of dispute is less than twice a month, which is considered a large number of monthly reported disputes.

In extreme situation, more than 5 times a month reported disputes were admitted by 14.62% of all the respondents and the remaining 12.31% stated that the dispute frequency is between 3 to 5 times per month.

Global report of disputes prepared by ARCADIS, demonstrated that solving dispute in construction industry is time and money consuming, and that dispute from the contractor point of view is tedious and costs loosing new projects opportunities and loss of gaining profit.

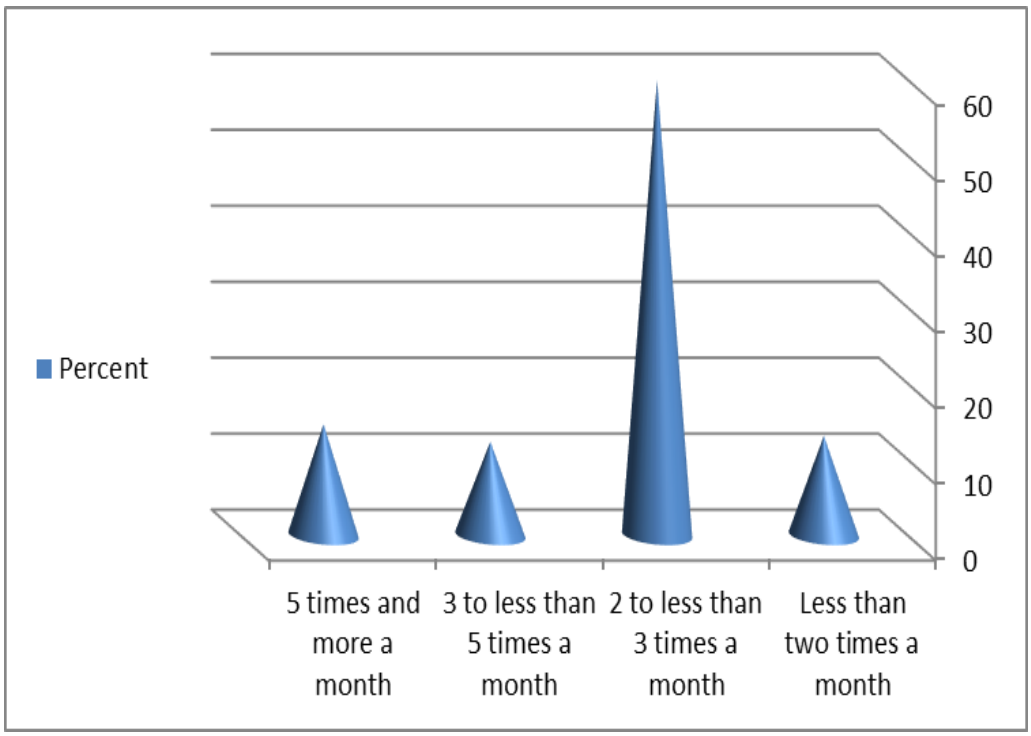


FIGURE 9. Frequency of dispute from the contractor

In details, as shown in **(Table 22)** the first-Degree contractors are facing disputes as a frequency of 2 to 3 disputes per month as a trend with a percentage of 66.13%, conforming to the data globally published through ARCADIS report, and these frequent disputes proves the significance of dispute occurrence in construction projects, and the massive efforts spent monthly to resolve them.

On the other hand, the frequency of monthly disputes tends to be less at the first-Degree contractors' firms according to the respondents replies. This frequency of 3 to 5 disputes per month, reaches a percentage of 6.45%, and more than 5 disputes per month frequency occurrence reaches a percentage of 8.06%, whereas is in the case of second Degree contractors the percentages reach to 17.65% and 20.59 %, respectively, as shown in (**Tables 22** and **23)**.

TABLE 22. The dispute occurrence frequency in the first-Degree contractors

Frequency of dispute occurrence	Number of respondents	Percent (%)
Less than two times a month	12	19.35
2 to less than 3 times a month	41	66.13
3 to less than 5 times a month	4	6.45
5 times and more a month	5	8.06
Total	62	100

Disputes in the second-Degree contractors' firms tend to increase monthly compared to the case of the first Degree contractors. This might be due to financial poorer funding faced in the second-Degree contractors' case, which influence more the cash flow in these firms than the first-Degree contractors.

TABLE 23. The dispute occurrence frequency in the second-Degree contractors

Frequency of dispute occurrence	Number of respondents	Percent (%)
Less than two times a month	5	7.35
2 to less than 3 times a month	37	54.41
3 to less than 5 times a month	12	17.65
5 times and more a month	14	20.59
Total	68	100

To identify the type of contracts that tends to have more disputes between the owner and the contractors, the respondents were asked about the most common type of contracts they are using in their work, and the answers revealed that the contractors used more frequently the lump-sum contracts with a percentage of 52.31%, followed by the unit-price contracts with a percentage of 38.46%, and the remaining with 9.23% is a cost-plus.

From those responses, it is indicated that the cost-plus type of contracts is not preferable to contractor and owner, because it is difficult to manage, and it requires lots of accounting and book keeping efforts. Lump sum contracts are easier for the owner in terms of accounting and payment.

To identify wether the disputes commonly occur in the lump-sum contracts, and analysis the factors causing disputes, and the root cause of dispute, these points are studied throughly in the next part of the study.

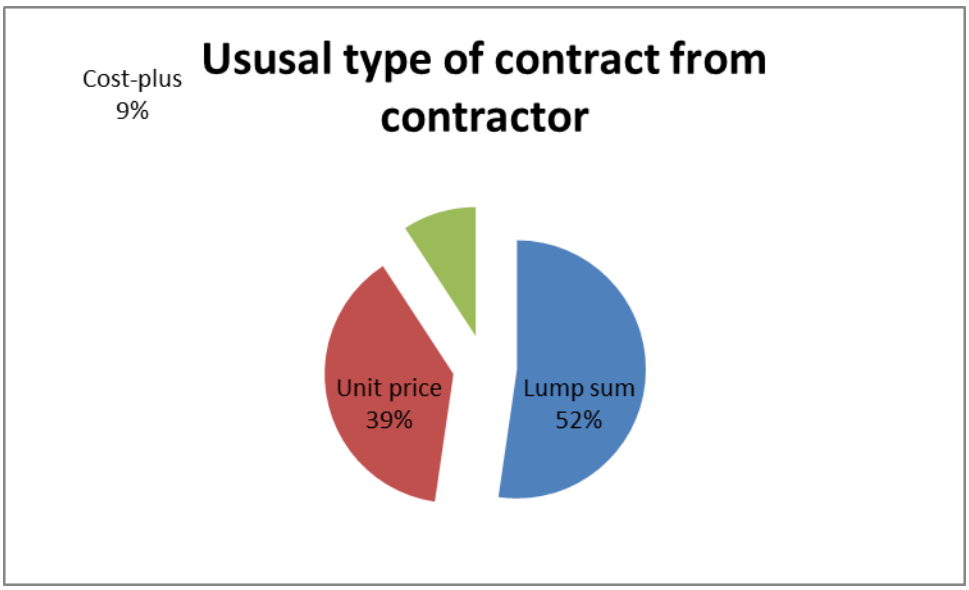


Figure 10. Type of projects' contract participated in the last ten years by the contractor

First and second-Degree contractors share almost equally the frequency of the awarded projects on a lump-sum contract basis, so, whatever applies to the reasons behind disputes in lump-sum contracts in the first-Degree contractors' firms also applies to the second-Degree contractors' firms.

It is important to mention that the first-Degree contractors used the unit-cost contract with a percentage of 30.65% and the second-Degree contractors used the same type of contracts with a percentage of 45.59%, as shown in (**Tables 24** and **25)**.

TABLE 24. Type of contract used frequency of the first-Degree

Type of contracts	Number of respondents	Percent (%)
Lump sum	34	54.84
Unit price	19	30.65
Cost-plus	9	14.52
Total	62	100

Unit-price contracts tend to be used more by the second-Degree contractors more than by first Degree contractors, which might be due to weakness of professional in-house team to study properly the total take-off of the project.

Percentage of cost assigned by the second-Degree contractors was 11.76% compared to 8.06% in the first-Degree contractors, which does not help the second-Degree contractors to study properly the project documentation, because they are not professional enough to do them.

Finally, the cost-plus contracts are used mainly by the first-Degree contractors because of nature of the projects, as it will be demonstrated in the contract conversion part of this study, and replied by the first-Degree contractors, with a percentage of 14.52%,

whereas, the second-Degree contractors used it in a percentage of only 4.41% as shown in (**Tables 24** and **25)**.

TABLE 25. Type of contract used frequency of the second-Degree contractors

Type of contracts	Number of respondents	Percent (%)
Lump sum	34	50
Unit price	31	45.59
Cost-plus	3	4.41
Total	68	100

4.1.2 Characteristics of the participating owners

This section demonstrates the characteristics of the owner's participants, who are the sources of the study information, to show and emphasize the reliability and credibility of the collected data.

Private owners are part of the study community, because their inputs, projects, and the way they are running their projects as owners/owner representatives shape the construction industry in Saudi Arabia. Our study takes the private and governmental project owners in Riyadh Saudi Arabia as the total community, those owners are who fund, invest, and harmonize the projects in the construction field in the studied community, and finally, they are passionately motivated to gain-out of their investments a financially reward or profit.

The chosen community owners represent the most sophisticated ones based on the size of the projects they own, cumulative experience, roles during construction, Internal organization system, type of construction contracts they have experienced, and how

they are managing the projects and the total experience of personnel hired for the company.

The respondents from the owner's side represent the highest level of owners running the construction industry among the construction community. Prestigious owners use construction as a developing tool to develop Saudi Arabia with the infra-structures, engineering projects, industrial projects, and the mixed-use projects.

All the respondents from the owners/owner representatives are senior personnel, and they are considered experts in their field, and their experience is reflected in the level of their education, occupied positions, their roles in construction industry, number of years of experience and number of projects completed in the last 10 years that positively influenced construction industry. Those owners/owner representatives come from a wide spectrum of background of facilities they in which they work. This was considered in order to increase our study creditability and reliability.

Respondents from the owners/owner representatives hold PhD Degree, and work as construction managers and project managers, have an experience from 5 to 10 years in the construction industry field, decision makers, completed from 5 to 10 projects during the last 10 years, and they are running the construction with dispute frequency less than twice a month. All of the aforementioned criteria show how experienced and highly educated personnel participate in the questionnaire, beside their intention to participate in the study by feeding back the researcher with best of their knowledge and answer that can be applicable to all stakeholders of construction and increase the creditability of the study.

Owners in the study are classified into two categories: private and governmental ministries.

In this research we will study both separately and compare between their answers and the contractor's characteristics.

4.1.2.1 Private owners

Private owner does not have necessarily to run their construction industry themselves, but they can deploy representatives to manage the construction, and consult him for general guidance and directions in final and critical decisions.

Private owners seek gaining a reward and profit after investment, and their education level is supported by skills. In our study, and as shown in **(Figure 11)**, 30% of the selected respondents are hold bachelor's Degree in different engineering disciplines, and 25% hold master Degree in various management and engineering specialists, while the rest hold have PhD Degree and are up to 45%, which reflects the familiarity of construction language, and experiences based on a scientific basis, which authenticates and improves the answers of or study survey.

This education level reflects the fact that they are the most educated personnel in community, utilizing their education in running business, in assistance to their experience in investments running successful projects.

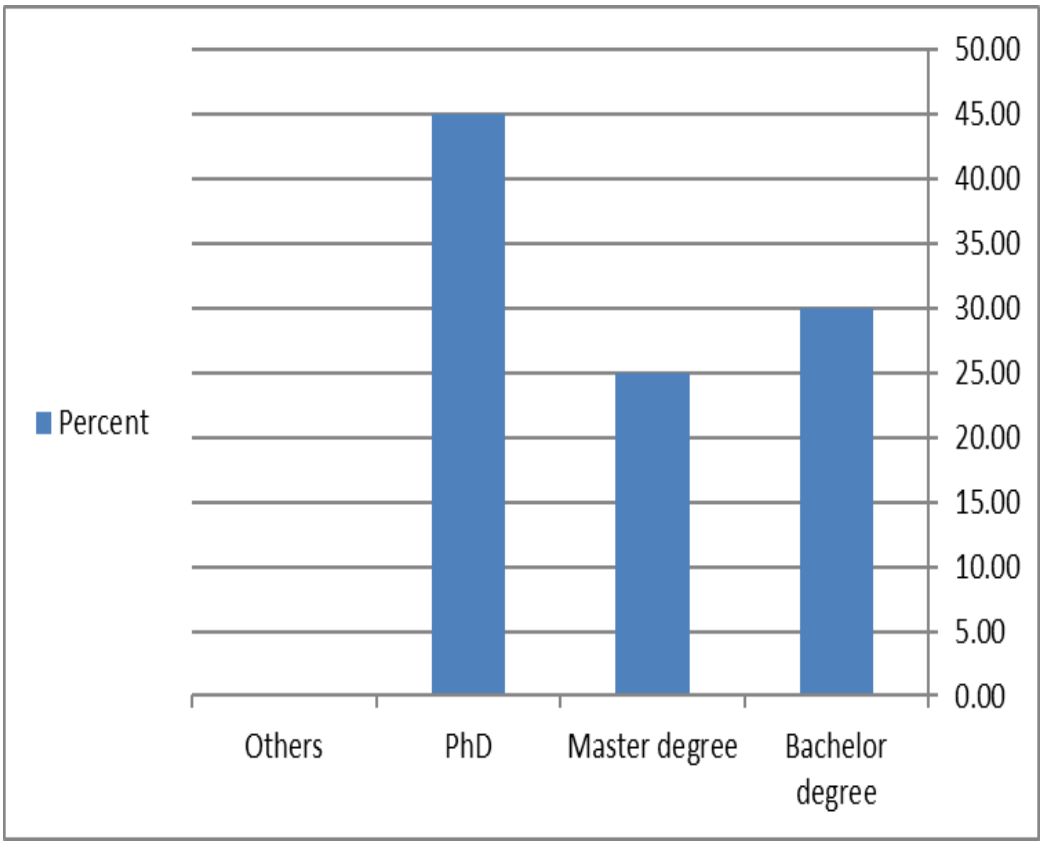


Figure 11. Education level of the private owner's respondents

Most of the participating contractors holds bachelor's Degree with a percentage of 79.03% from the first-Degree contractors, and 98.39% from the second-Degree contractors, but in the private owners most of them hold PhD Degree with a percentage of 45% **(Figure 11).**

Owners are more educated than the contractor, which might be explained by the wealthy condition of private owners, and thus reflected on the prestigious certificate awarded among them.

Owners shows that 35.0% of their work as a construction manager as a direct owner or owner-representative. This position is the most involved in organizing target accomplishment and securing the project with construction main feed triangle (approved shop drawing, material and equipment, and work force), and therefore, this position has the highest percentage of recruitment by all constructions stakeholders. This position occupied by personnel who has experience around 10 years. Private owner's respondents have less construction managers than the contractors, which could be due to the duties and responsibilities matrix definitions of this position that is needed more for contractors' firms than the owners.

A percentage of 20.0% of the respondents from the private owners, work as project managers, who follow the payment certificates, and works as a connection contact to outside the firm. Usually have an experience more than 15 years in well-organized firms. Private owner's respondents have almost the same percentage of this position with the contractors.

Architecture engineers from the private owners' respondents represent 5% from the total respondents, which is a bit less than the contractor percent, because the contractors seem to have the benefit of the architect engineer in-house to generate the

sectional drawings and details more in projects, than designing the aesthetic envelope of the project in the owner firm.

Funding the project, budget cost, and preparation of the cash-flow of the project are tedious tasks handled by the cost manager at the private owner firms. At the opposite these tasks are still valid in the contractor's firms, but it seems to be reviewed more frequently and planned in earlier stages of the project, and the cost manager only needs to update them.

General Manager's respondents from the private owners represent 15%, who almost have the same duties and responsibilities of the project manager. Contractors are in less percentage as general managers when compared to private owners, and this maybe due to the practicality that contractors manage projects, so project management is divided between more than one manager and under different job titles.

A percentage of 5.0% of the respondents from the private owners are project directors, who manage the project's parcels. Usually, the personnel who are occupying this position have an experience of more than 20 years. Percentages of respondents from the contractor and the private owners are almost the same because a person at the top of the management has to be unique.

The remaining 5.0% works in other positions for the private owners like business investors. Other position in the contractors works are different positions like financial auditors, and commercial managers.

Comparison of the job titles of the private owners to the contractors, is shown in below in **(Table 26).**

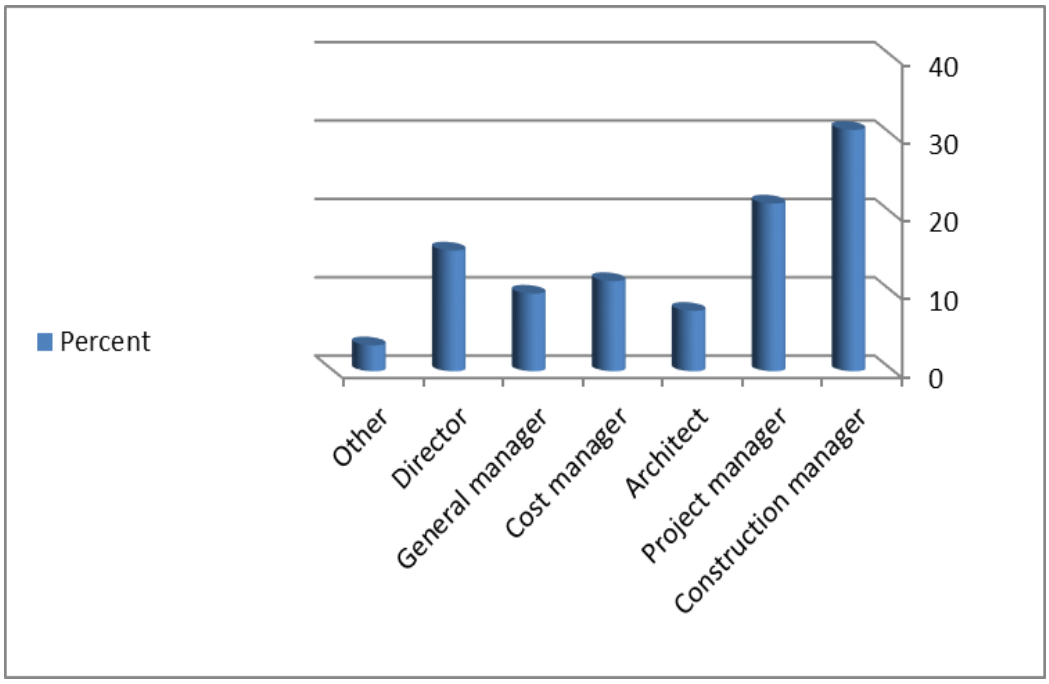


Figure 12. Job title of respondents from the private owner's respondents

Table 26. Comparison between the contractors' job titles and the private owners' job title

Contractors' job title	Number of respondents	Percent (%)
Construction manager	57	43.85
Project manager	29	22.31
Architect	9	6.92
Cost manager	13	10
General manager	8	6.15
Director	8	6.15
Other	6	4.62
Total	130	100

private owners' job title	Number of respondents	Percent (%)
Construction manager	7	35
Project manager	4	20
Architect	1	5
Cost manager	3	15
General manager	3	15
Director	1	5
Other	1	5
Total	20	100

Table 27. Role of respondents from the private owner

Role	Number of respondents	Percent (%)
Decision maker	12	60
Advisory	0	0
Assessment	6	30
Others	2	10
Total	20	100

Private owners are investors in the construction industry. They determine the need to match the vision and the requirement of the project, that's why they are considered better decision-makers to alter, change, and modify the project and the construction activities to meet their requirements. Out of the respondents, 60% works as decision-makers.

Contractors from the first and second Degree have more decision-makers people that reaches 85% out of the respondents, because their uncentralized style of management, while the private owners are more likely to follow centralized management style.

Advisory position in the private owners is missing, and is replaced by the third-party management team, while in the contractor it does exist.

Assessors are most likely the owner representatives who asses the construction and report it back to the owners with limited authorities to change or take a major decision. Contractor's assessment of the respondents represents 3.08%, indicating that the assessment role in the contractors are done mighty in each process, by the individuals, and integrated at the end by the project manager. Assessors from the private owners

represent 30% of the whole respondents because they are reporting more to the owners to take the decisions accordingly.

Other positions in the private owners like legal department head and contracting and procurement managers represent 10% only. On the other hand, these other positions in contractor firms like financial manager's represents 7.7% of the total respondents.

Majority of the private owners have experience from 5 to 10 years with a percentage of 40%, which is most suitable to fill the position of a construction manager, as explained in the previous section, matched with one third of the respondents from the contractors.

Experienced personnel from 10 to 20 years represent 30% from the total respondents. This experience matches the position of a construction manager.

More than 20 years experienced personnel represent 15% only, who usually work in the project directors and those respondents are the elite of the private owners whom their responses are considered experts in the field.

Less experienced personnel with less than 5 years represents around 10% only, which is not a minor percentage, but it is considered not sufficient to manage a project, specially the decisions needed to be taken by the owner/owners' representatives. This year of experience is matched with the contractor's side with a percentage of 1.54% from the total respondents, for maybe the regulation of municipal and rural affairs, and the internal policies of the contractors' firm, which applies to all categories of experiences.

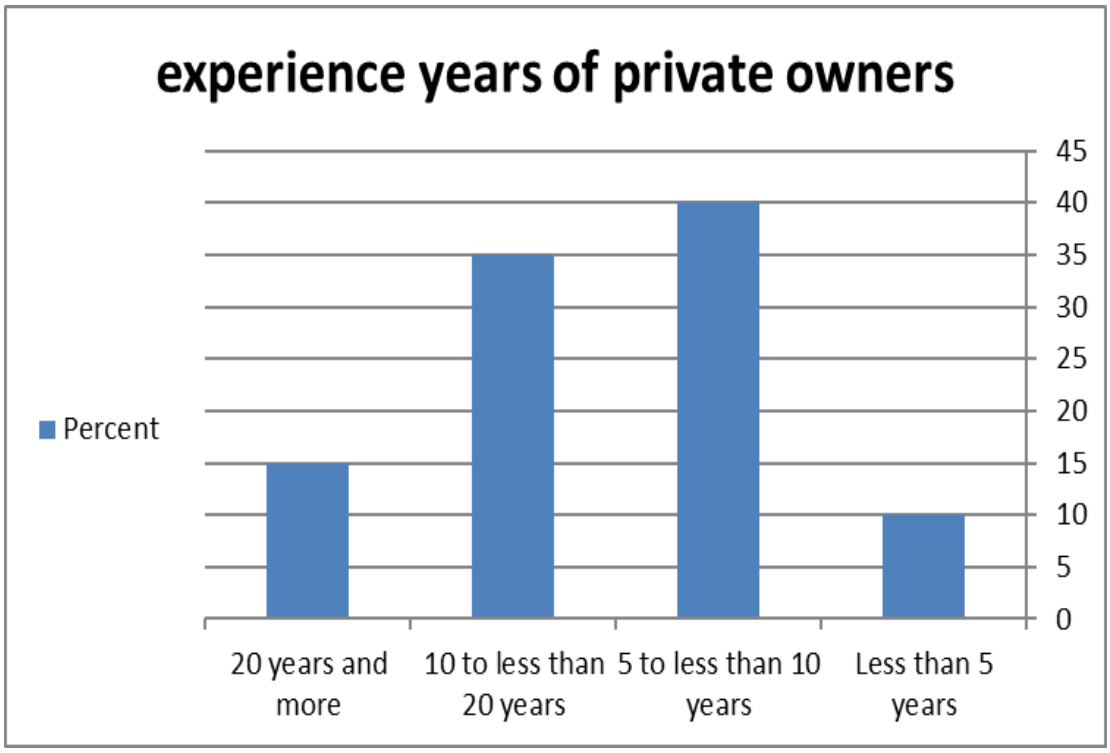


Figure 13. Experience of the respondents from the private owners

Contractors' personnel from the first-Degree contractors have the most experienced staff, with a period starting from 10 to 20 years of experience, while the second-Degree contractors have personnel experienced from 5 to 10, and finally the private owners have personnel with experience from 5 to 10 years.

In general, private owners have completed less than 5 projects during the last ten years, 15% completed from 5 to 10 projects, 10% completed from 10 to 20 projects, and the remaining 20% completed more than 20 projects.

Overall these are reputed projects completed by those personnel, which indicates keenness for projects administration, and thus strengthen the reliability of the study.

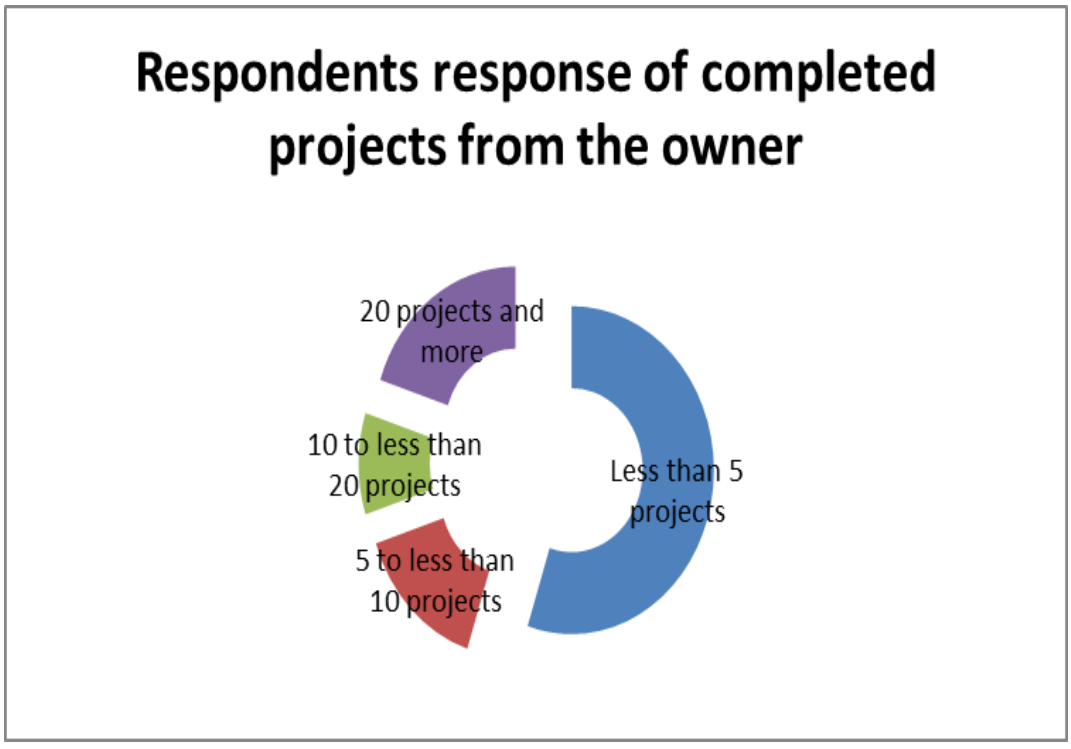


Figure 14. Respondents completed projects from the private owner

In comparison to the respondents from the contractors of first Degree most of them have completed from 10 to 20 projects during the last ten years, showing that the owners are not in-line with completed projects by the contractors for the following possible reasons:

- Contractors finalize these projects which was ongoing from the previous years.
- Project owners and contractors might be in different cities other than Riyadh, which is the scope of the study.
- Different type of project owners, like the governmental ministries.
- Small projects can be awarded and completed during the year, while other projects are large and still ongoing.

Second Degree contractors completed mostly the same number of projects finalized by private owners during the last ten years (from 5 to 10 projects), reflecting the tendency of the private owners to award the project to the second-Degree contractors, as mentioned and shown in the contractors' characteristics.

Private owners are classified in this study as a separate category, and all of them are national owners, and employer.

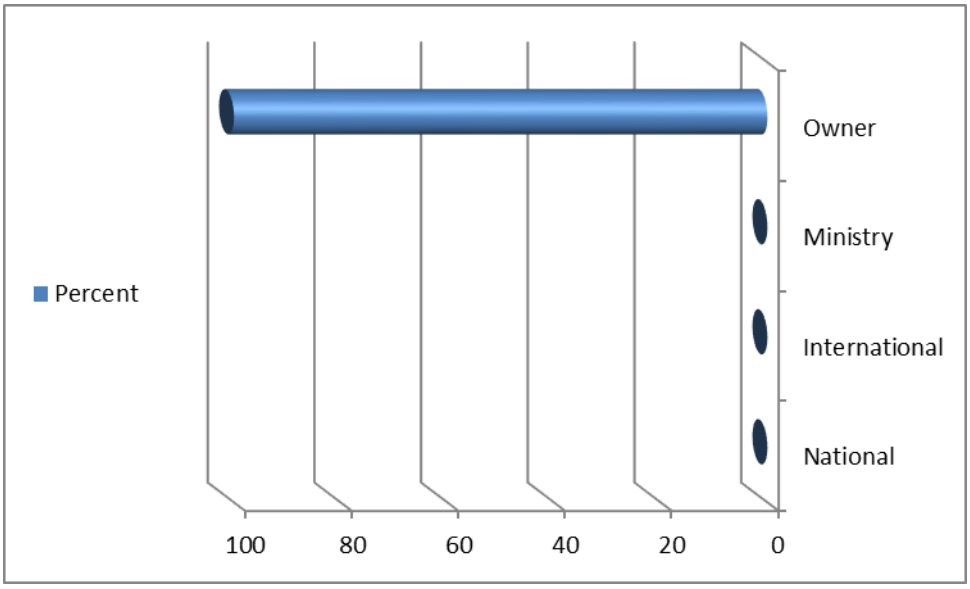


FIGURE 15. Nationality of the private owner employer

In comparison the first to the second-Degree contractors, most of them are national companies. International first-Degree contractors are only 19%, and the majority is national with a percentage of 80.65%.

Second Degree contractors are only 8.8% international companies, and the majority is national companies with a percentage of 91.2%, as demonstrated in the below tables.

TABLE 28. Comparison between the first and second-Degree contractor's nationality of employer

Nationality	Number of respondents	Percent (%)
National	50	80.65
International	12	19.35
Total	62	100

Nationality	Number of respondents	Percent (%)
National	62	91.18
International	6	8.82
Total	68	100

Now to compare the dispute occurrence frequency of contractors to the private owners, and to verify if the disputes are only faked by the contractors without any basis, the participant of the private owners was asked about the frequency of the dispute, and their responses almost matched the contractor’s of the existence of the dispute.

Frequency of dispute stated by the private owners is 65% less than twice a month, which is the major frequency stated by the private owners. Compared to dispute in the contractors' side it is less, which is 13.08%, but the frequency is more in the contractors firm than the owners as what will be stated next.

Another 15% of private owners concur that the frequency of dispute is between two to three times per month. Contractors show that this slot of dispute frequency is

significant, with a percent of 60%, showing that the contractors are disputing the owner more than the owner doing, which could be due to financial restraints.

Poorly designed projects, with poor management could increase the rate of disputes monthly to 3 to 5 times as it was shown in 15% of the respondents' from private owners.

Remaining 5% of the respondents answered that the frequency of dispute occurrence is more than 5 times a month, which is the worst situation. This sever situation matched with a higher percentage from the contractors to reach up to 14.62%, indicating the difficulties the contractors face when having disputes with this high frequency.

All the aforementioned indicates that the disputes from the owners point of view is controllable, and it is usually less than twice a month, opposed by 2 – 3 times a month by the first and second Degree contractors. The difference in dispute frequency between the private owners and the contractors might be with the governmental or with private owners but from outside the study community of Riyadh, Saudi Arabia.

To study the type of contracts that causes the most disputes from the point view of private owners, we asked them about the most common type of contract awarded to contractors and the answers were 25% of contracts usually signed by the private owners are lump-sum, 60% of contracts are Unit-price and the remaining 15% is Cost-plus contract amended by the private owners.

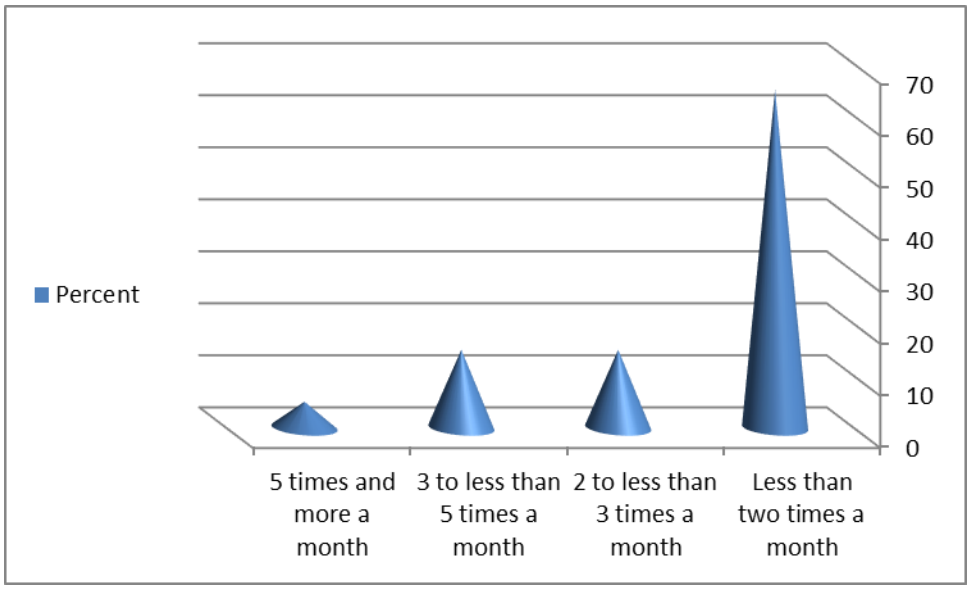


Figure 16. Frequency of dispute from the private owner

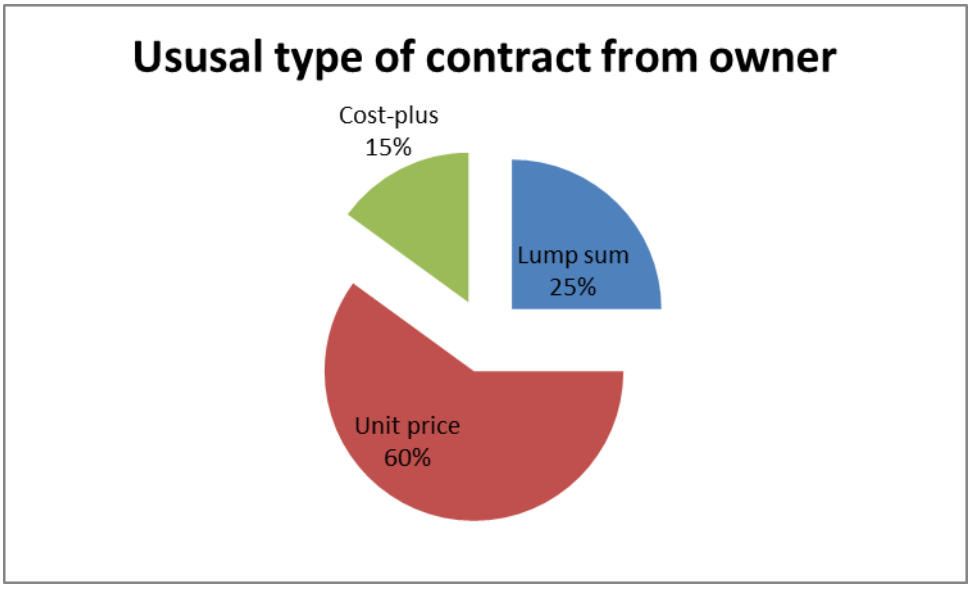


Figure 17. Usual type of contracts used by the private owners

Percentage of the signed unit-cost contracts from the private owners' perspective is 60%, but the contractors signed almost half of this percentage, which could be due to signing this type of contracts with governmental sector or with parties outside this study community. The same situation applies to lump-sum contracts between the private owners and the contractors.

Owners signed 3 cost-plus contracts, while the contractors signed 12 contracts. This could be justified that the remaining contracts are signed in cities outside the scope and the community of this study.

4.1.2.2 Governmental ministries

This section shows the characteristics of the governmental ministries of the projects in order to enhance the creditability and reliability of the study, and to describe their characteristics or criteria.

The participated governmental ministries are from all official ministries in Saudi Arabia in projects and supervision departments. Construction trend and industry rendered after their influence of the projects with their qualified personnel and size of projects they are awarding.

Governmental ministries are the last participant of the study community, and they represent a 21.7% from total projects owner at Riyadh, Saudi Arabia (the study scope). They are more organized and regulated through their standard form of contracting, dispute resolving board, and methods of awarding the projects and preferring one contractor over other. Governmental projects are issued to fulfill the population

demands on the infra-structure, production and engineering facilities, and to serve the governmental needs of construction.

Governmental ministries built through the years big cumulative regulations, and standard procedure of contract awarded to contractors, with all the conditions, and payment terms, making this owner one of the best owners awarding a contract to any contractor.

The respondents from the governmental ministries represents the last part of the construction community, they are covering the official governmental contracts/construction industry among the whole community. This type of construction is used to fulfill the increased pressure on infra-structure of the country, and the governmental buildings with all the expansions and re-innovations.

All the respondents from the governmental ministries are also senior personnel, comes from different spectrum of educational levels with a minimal of B.Sc. Degree, experience in the field that qualifies them to manage super-large projects, that influenced the construction industry by complying with the set governmental regulations and rules, which completed more than 5 projects with manageable disputes.

The selected respondents from the governmental ministries hold bachelor's Degree with a percentage of 67.7% out of the respondents, and also 20.6% of them hold master's Degree in management and business administration, while 8.8% hold PhD Degree in various specialists, and the last 2.94% has other certificates such as law and accountancy in the commercial departments. Their high education level and scientific background help them resolve the technical and managerial disputes**,** to assist them in administering the construction, and indicate the high profile of the participant to give

enthusiastic and authentic answers of best practice they do to serve the researcher questionnaire.

Table 29. Education level of the Governmental respondents

Level of education	Number of respondents	Percent (%)
Bachelor Degree	23	67.65
Master Degree	7	20.59
PhD	3	8.82
Others	1	2.94
Total	34.00	100.00

On other hand, contractors have more bachelor Degree holders than the governmental ministries (84.6% of respondents from contractors' holds bachelor Degree), and this might be referred to the involvement of construction industry by the contractor personnel, leading to shortage of time needed for their staff to pursue the highest Degree certificates.

Other certificates holder (master and PhD) are almost the same percentage between the contractors and the governmental ministries. There is only a minor tendency to higher education in the governmental ministries, which seems to follow functional promotions in the governmental ministries' firms based on the education level as criteria.

Private owners have the majority holding a PhD Degree, unlike the governmental ministries who tend to hold the bachelor Degree, which might be due to the less motivating system followed in governmental ministries which does not push the personnel to enroll highest education.

Respondents from the governmental ministries' works as a construction manager with a percent of 30.8%, while another 21.4% are working as a project manager with a high experience up to 20 years. Architecture engineers represents 7.7% from the governmental respondents because this position is not highly needed, unless for the total aesthetic envelope of the project.

A percentage of 11.5% of the respondents work as cost managers, who mainly control the expenditures and prepare the cost not exceeding the budget. This percentage of respondents is a mid-value between the contractors (10%) and the private owners (15%), which may be referred to the separate entity of finance in the governmental ministries (ministry of finance) which handles all the finance duties, unlike the private owners and the contractors.

General Managers represents 9.9% in the governmental firms out of the respondents. The percentage of general managers responded to the questionnaire is again a mid-percent between the private owners and the contractors, and that might be due to the governmental firms that tend to assign board of projects reviewers rather than assigning a separate general manager for the projects in the private owners. Moreover, the contractors tend to divide the project into partial stages.

Governmental assigns more project directors with a percentage of 15.4% more than the contractors and the private owners, which could be a difference in the positions titles, only.

Percentage of other positions are almost similar between all the firms (private owners, governmental ministries and contractors), but the positions are different from one to another.

Construction managers in the private owners, governmental ministries, and contractors are dominants, and that is referred to the high need of their positions in the construction industry because they are the driving force who initiate and monitor the daily work tasks and activities among the labor level and translate the plans and schedules into actual manifestation. The positions classification of the respondents from the governmental firms shows that they are from the top management of the owners, who are experienced, and enhance the integrity of the study.

Table 30. working positions of Governmental from the respondents

Job title	Number of respondents	Percent (%)
Construction manager	8	23.5
Project manager	11	32.3
Architect	0	0.0
Cost manager	0	0.0
General manager	7	20.5
Director	5	14.7
Other	3	8.8
Total	34	100

As most of the governmental respondents are in the positions of construction manager, general manager and directors it requires from them to take decisions to manage and run the construction projects, this is shown in the respondents' role construction projects, which is reflected in 58.82% decision makers.

The same range of percentage out of respondents from the private owners are also decision-makers, but this percentage raises up in the contractors firms, which could be justified by the style of management and running the construction industry at the contractors firms.

A percentage of 11.76% advise the governmental firms to conduct projects on a periodic schedule, based on the assessors from the same firm or from a separate

management entity, that why we might find this role more common in the governmental firms than it is the private owners (0%), and the contractors (4.9%).

Another 11.76% work in assessment (works like internal inspectors in the firm) and report the status to the top management of the construction department and the ministry board. On the other hand, the assessors at the contractor's firm are prepared by the same construction team mostly, and more likely there are no separate assessors (3.07%). Private owners tend to assign more assessors which might be due to available financial funding obtained from banks through the facilities, and who occupy this position are (30%).

The remaining 17.65% of respondents from the governmental firms works in other positions like legal advisors, handing-over department and senior financial officers.

Decision-makers in construction depends on an un-centralized style, because the centralized approach would take more time till the issue is raised to the concerned decision-maker, to decide how to act, but it gives authorities to personnel in the field to manage with certain limit, which is seen obviously by the percentage of decision-makers in contractors which reaches to 85%.

In summary, the interviewed personnel from the governmental ministries are well-qualified, deeply involved in construction, able to provide more accurate answers to the study by which the credibility of the research is Enhanced.

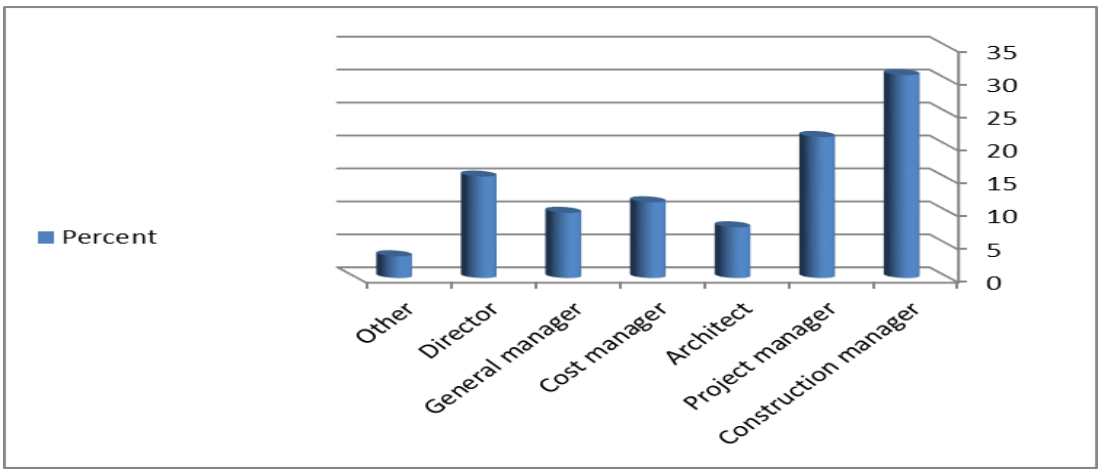


Figure 18. Role of respondents from the Governmental

Positions in organized owners, regulated by governmental legislations do not accept less number years of experience to cover the position, which will be thoroughly studied next.

Most of the respondents have an experience from 5 to 10 years (58.82%), which authenticates their responses, along with their cumulative education, built experience throughout the years in construction industry. That formulates a high-profile engineer and expert in the field, in which his response would be taken into consideration in the construction industry.

A percentage of 17.65 % are have more than 20 years of experience who are in the director position, which is almost the same slot of experienced engineers in the contractor and the private firms. And the same percentage of interviewed from the governmental ministries whose experiences are less than 5 years, un-like the private owners and the contractors, where in the contractors firm only few of them (1.54%) have that level of experience, and the rest of them are more experienced, and the private owners slot of experience is represent 10% from the all respondents.

A percentage of 5.88% have an experience of 10 to 20 years, which is usually occupied by general managers. This slot of experience is the dominant in the contractor firms with a percentage of 46.92%, and that may be due to the construction cycle that turns around every 20 years. The same slot of experience in the private owners represents 35% from the total respondents, which seems to be the second most dominant personnel of all the respondents.

In conclusion the interviewed/participant in the study from all the community of the study are experienced engineers, who are able to easily identify the disputes and react to resolve them in properly, therefore, classified as the experts in the construction.

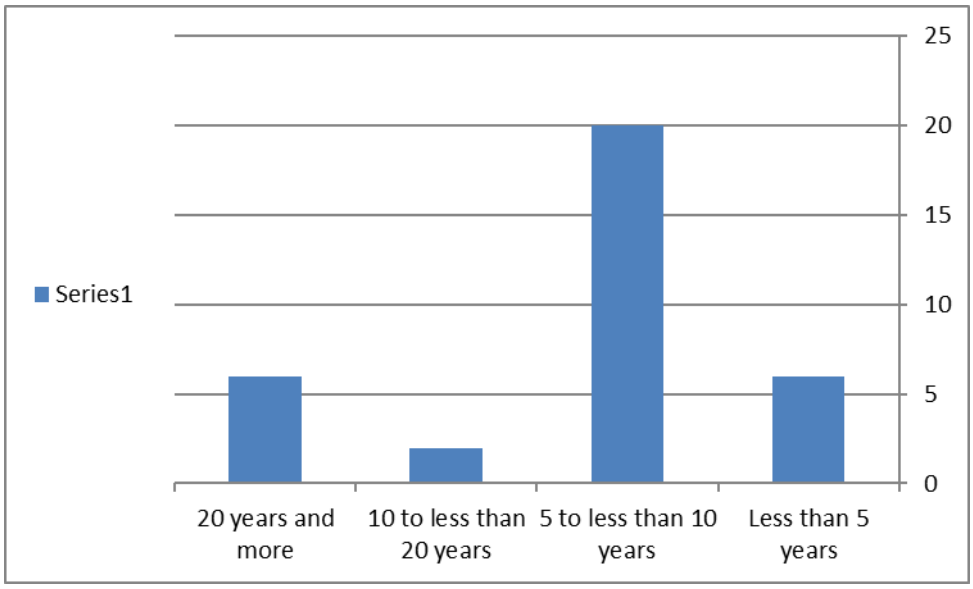


Figure 19. Experience of the respondents from the Governmental

To enhance building up the full characteristic profile of the respondents from the governmental ministries, and to determine the size of the projects they participated in during the last ten years of their experience, they were asked about the number of completed projects they have finalized, and their responses were as follows:

The majority of the respondents completed from 5 to 10 projects with a percentage of 47.06% during the last ten years. This slot of project completion at the contractors are still dominant with around 53% percentage, but it is less at the private owners firms (15%) which might be due to difficulties in securing the fund in the last ten years, and the little insecurity of capital.

From the governmental respondents, 14.71% completed less than 5 projects, representing an average of two-year need for each project, which is very acceptable and logical rate in industry. This slot of project completion in the contractors was the minimal (1.54%), indicating the momentum they are turning over the projects, but the difference between the owners and the contractors might due to the old un-completed

projects or the scope of the study. Private owners awarding percent raises up to 55% justifying the difference between the completed projects.

Around one third of the governmental respondents completed from 10 to 20 projects during the last ten years with a percentage of 29.41%, and this is almost the same percentage of the contractors who were awarded the projects, but the private owners completed the same number of projects with only 10% out of the all respondents, which indicates that the number of projects share during the last ten years.

The remaining 8.8% completed more than 20 projects during the last ten years, which might be due to the governmental reduction in expenditures. Contractors completed more than 20 projects in the last 10 years with a percentage of 15.38% due to difficulties in the fund and delay in payments. Private owners completed the highest percentage of more than 20 projects with a percentage of 20%.

Table 31. Respondents experience from the Governmental

Projects	Number of respondents	Percent (%)
Less than 5 projects	5	14.71
5 to less than 10 projects	16	47.06
10 to less than 20 projects	10	29.41
20 projects and more	3	8.82
Total	34	100

It is important to mention that the governmental ministries are classified in this study as a separate category of project employers, and nationality of the project owner where they are all national, governmental firms, while the contractor could have an employer national or international, and the project owners could be governmental or private.

In order to examine dispute frequency at the contractor and the private owners that are extended with the same rate to the governmental ministries, the interviewed personnel were asked about dispute frequency occurrence.

It is found that the frequency of dispute in general are minimal with a percentage of 44.12%, which might be because of standardization of contracts, delay of payments and the new payment submission methods. This percentage is exceeded by the private owners to 65%, which might be due to the maturity of the private owners, and the greed to receive the reward and profit of the investments as soon as possible. The Contractors face more disputes than others as shown from the respondents' replies to this slot of dispute frequency occurrence with a percentage of 13.08%.

Dispute frequency of 2 to 3 times monthly reaches a percentage of 35.29% from the total governmental respondents. This slot of dispute frequency in the contractor's sector is dominant with a percentage of 60% from the total respondents, showing the tendency for more disputes, which is due to submission of un-documented valid claims. Private owners have dispute frequency with same slot with less percentage that reaches 15%.

Dispute from 3 to 5 times monthly reaches a percentage of 11.76%, which is almost the same rate at the private owners and contractor firms.

Lastly, in extreme worst situation, the dispute frequency is more than 5 times a month with a percentage of 8.8%. This frequency shown to be more in the contractor firms with a percent of 14.62%, because the contractors tend to submit claims to overcome their losses without proper documentations. While this is the situation at the contractors firms, it is quite different in the private owners where this frequency percentage drops down to 5% which is again could be due to the tendency to have

reward and profit from the investment, so resolving disputes must be at its earliest stages.

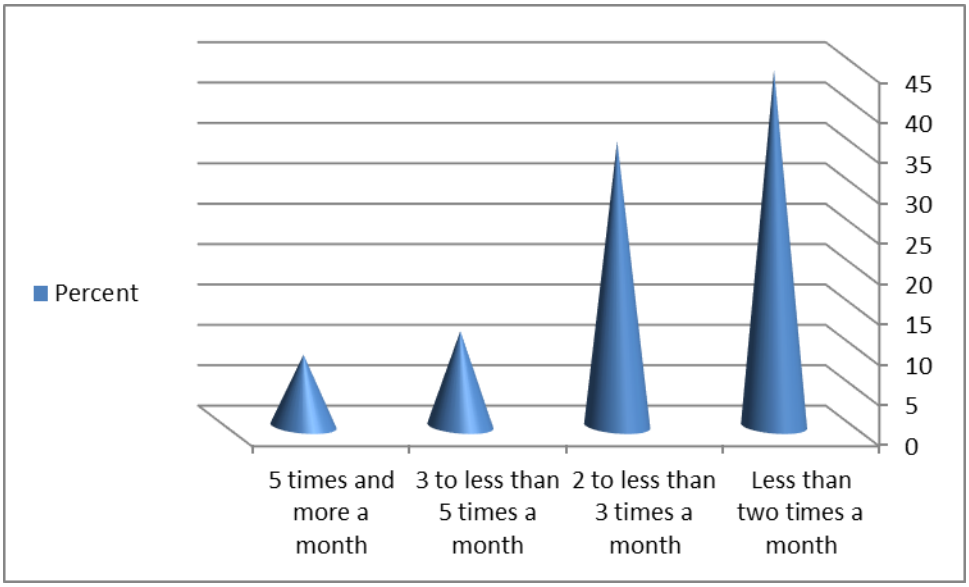


Figure 20. Frequency of dispute from the Governmental

The last points to be compared between all the community studies are the type of contracts that is having the most disputes among all the participants.

Governmental ministries tend to amend the unit-cost contracts in construction in general with a percentage among all the respondent's reaches to 67.65%, that is might be due to the flexibility in omission and addition in this type of project contracts.

Private owners signed the unit-cost type of contract with the same percent, indicating that the owners tend to award the project to a contractor with this type of contracts. Contractors signed the same type of contracts with a percentage of 38.46%, which might be justified that the rest of contractor who signed this type of contract is outside the study community.

Last 32.35% of the governmental respondents amended contracts on a lump-sum basis, which is a mid-value of contracts signed by the contractors and the private owners, because of the easiness of administering the contract from all the parties. Contractors signed lump-sum contracts mostly with a percentage of 52.31% which again shows that it gives them more opportunity to claim and dispute. Private owner on the other hand signed the same contract with a percentage of 25% for their benefits not to exceed the total contract value.

What is interesting here is that the government did not sign any cost-plus contract for a project because this type of contracts does not have a budget or limit, which is against the governmental regulation and rules, while the contractor and the private owners signed this type of construction contracts due to the project nature.

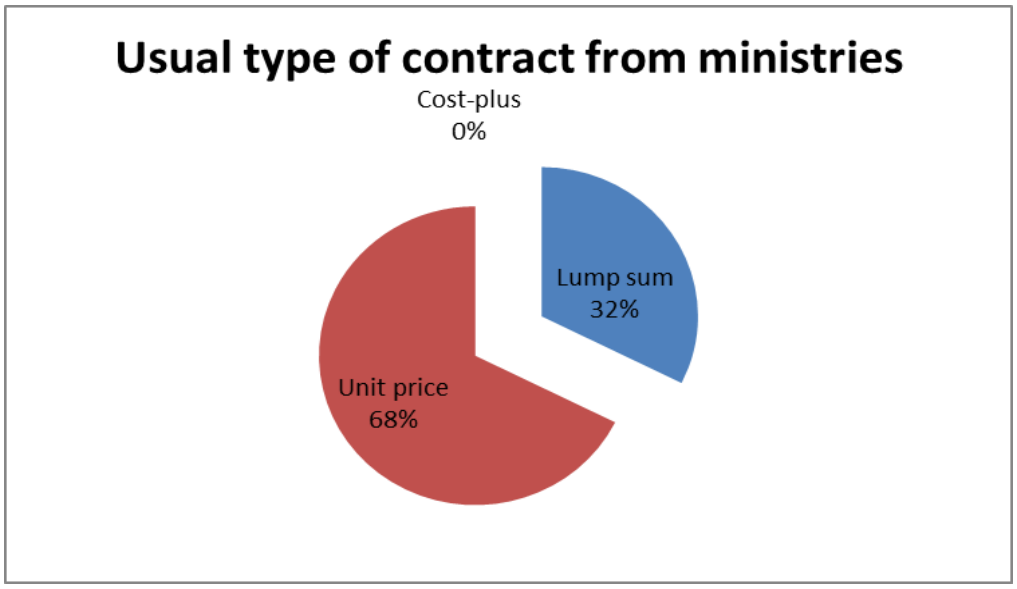


Figure 21. Usual type of contracts signed by the Governmental

All the study participants are highly experienced engineers, who work in different positions of construction stakeholders, with a high experience, and influence on the industry, which makes them experts in the industry.

After all it was observed that the lump-sum contracts are the most signed contracts among all the owners and the contractors, and it is a big source of dispute between them which might be due to in-accuracy of preparing the contract documents, and its scope.

Secondly, the unit-cost contracts are the common contracts used in construction, and it causes the dispute in case of in-accurate specification of the project items.

4.2 Reasons of Disputes

This section we aim to study the main factors according to the contractors and the owner's point of view and cause the dispute between them.

Factors are abstracted from the questionnaire sent to them, after converting the value of the responses to a value on a scale from 1 to 5 (1 is the least repetitive answer, and 5 is the most repetitive answer), then calculating the mean for these answers, standard deviation, testing the significance of the factors wither it exceeds the chosen cut-off value and finally trying to justify them.

Kolmogorov-Smirnov test was utilized to assess whether the (Common important construction contractual disputes) variables follow (normal) distribution. The tests is

statistically significant for all the variables (P<0.05), so we can safely use non parametric test such as (Kruskal-Wallis test) instead of one way- ANOVA.

Kurskal Wallis test (A non-parametric test) was used to compare four types of contractors or independent groups (*National /International/ Governmental ministries/ Private owner)* regarding common important construction disputes. If The P-value is less than 0.05, then there is significant difference according to the type of contractor and if it was more than 0.05 there is no significant difference according to the type of contractor.

- Reliability of the scale using Cronbach's coefficient alpha:

Cronbach's coefficient alpha was used to measure the reliability of the potential factors that might cause a dispute between the contractor and the owner (common construction contractual disputes scale). Cronbach's alpha is a measure of internal consistency, that is, how strictly a set of things are related as a cluster. The higher values reflect a higher Degree of internal consistency [20]. As shown in appendix (C) that Cronbach's alpha coefficient was calculated for the [24] common construction contractual disputes. The reliability of the scale was found to be high (0.883) [17]. This value is considered high and close to the perfect value (+1.0). These results make guarantees the reliability of the scale.

4.2.1 Contractor point of view for reasons of dispute

The following sub-chapter studies the main factors for disputes from the contractors' experts' point of view in the field, after testing the mean, and selecting only above 3 for further test of significance.

After identifying the main factors of dispute, we compare the answers for the factors of dispute in construction from the point of view of each category and identify the unique main factors for each characteristic of contractors.

In this sub-chapter we studied the responses from all the contractors, classified them according to the response into a scale from 1 to 5, then test the mean for all the values, finally test the significance of these factors.

Table 32. Respondent reason of dispute from the contractors point of view

S/N	Description	Average value of contractor responses	Standard deviation	P value of Z test	Is the value significant ?
1	Weakness in contract language and instrument	3.28571428	1.0168276	7.51093E-05	Yes
2	Un-awareness of the governing rules in the appendixes	2.42045454	0.8972541	1	No
3	Un-awareness of the governing rules that regulate the work in the country	2.41477272	0.9156468	1	No
4	Un-awareness of the governing of the commercial regulations	2.58522727	0.9934689	1	No
5	Long period of project hold	2.42613636	1.0502782	1	No
6	Un-awareness of the project milestones	2.67613636	0.9336251	0.999998	No
7	Un-awareness of the stated construction method	2.84090909	0.9548237	0.986463	No
8	Change in the item description and quantities in the BOQ	3.60227272	1.2470744	7.42E-11	Yes
9	Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work)	2.55113636	0.9958191	1	No
10	Inaccurate specification of items	3.69886363	1.2306555	2.46E-14	Yes
11	Ambiguities in the contract documents	3.88068181	1.2432545	0	Yes
12	Contradiction between the project documents.	4.09090909	1.2012979	0	Yes
13	Mixing the lump-sum item and the unit-price items in the same contract	2.3125	0.9375119	1	No
14	Changing the project specification after the material approval	3.11931818	1.0378392	0.063601	No
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	3.27272727	1.0334659	0.000231	Yes
16	Ambiguity in the project boundaries	2.72727272	0.9529175	0.999926	No
17	ambiguity in project responsibilities between the contractor and the owner	2.59090909	0.9578113	1	No
18	Lack of Setting a reference for the disputes between the owner and the contractor	2.56818181	0.8789013	1	No
19	Un-realistic time schedule of the project	3.76136363	1.1661346	0	Yes
20	Delays in handing over the site to the contractor	2.66477272	0.8725057	1	No
21	Interfering in the contract execution of the contract by the owner in severe affecting way	3.39204545	1.2046312	7.888083E-06	Yes
22	Delay of response to the requested decisions by the owner	3.38068181	1.0941253	1.957480E-06	Yes
23	Un-skilled contractor workers	2.75	1.0663690	0.999065	No
24	Shortage of the skilled workers in the labor market	2.78409090	1.0577481	0.99661	No
25	Sizable sub-contractors and out-sourcing	2.82954545	1.0334031	0.985673	No
26	Error in developing the bidding such as estimation	2.63068181	0.9411066	1	No
27	Lack of quality	2.66477272	1.0006329	0.999995	No
28	Low quality in administration processes	3.28977272	1.0855455	0.000199	Yes
29	Fault negotiation procedure between the parties	2.35795454	0.8296259	1	No
30	Inaccurate BOQ in the lump-sum contract	3.85795454	1.1198185	0	Yes

(5 Points Likert scale: Very High= 5, High=4, Somewhat High =3, Low =2, Very low=1)

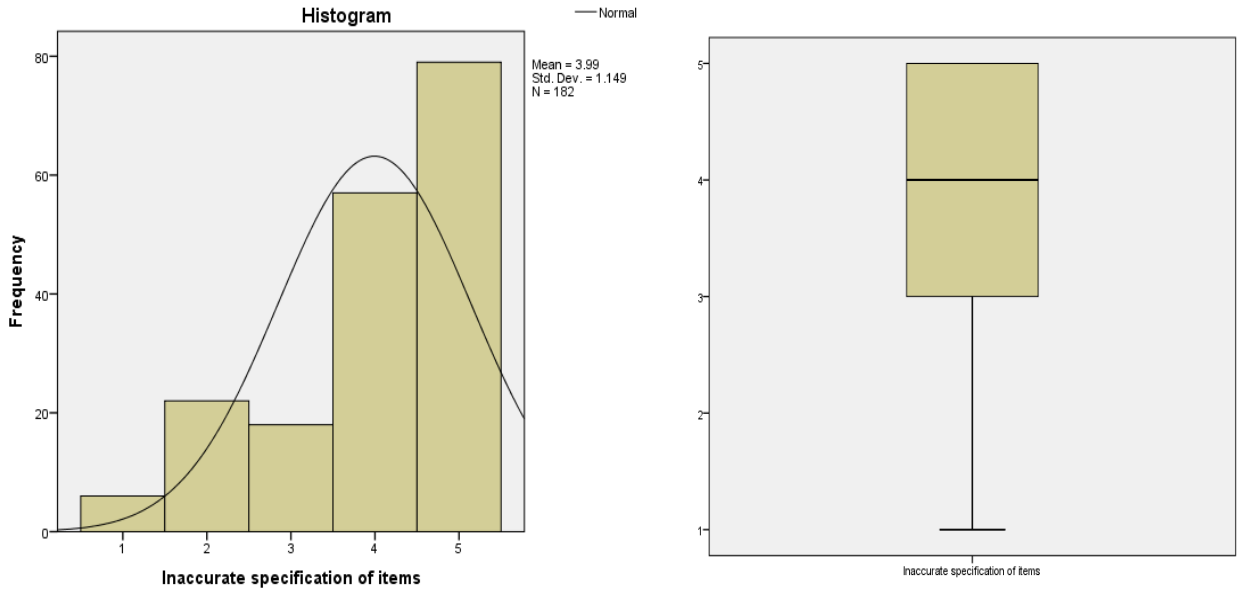


Figure 22. Inaccurate specification of items

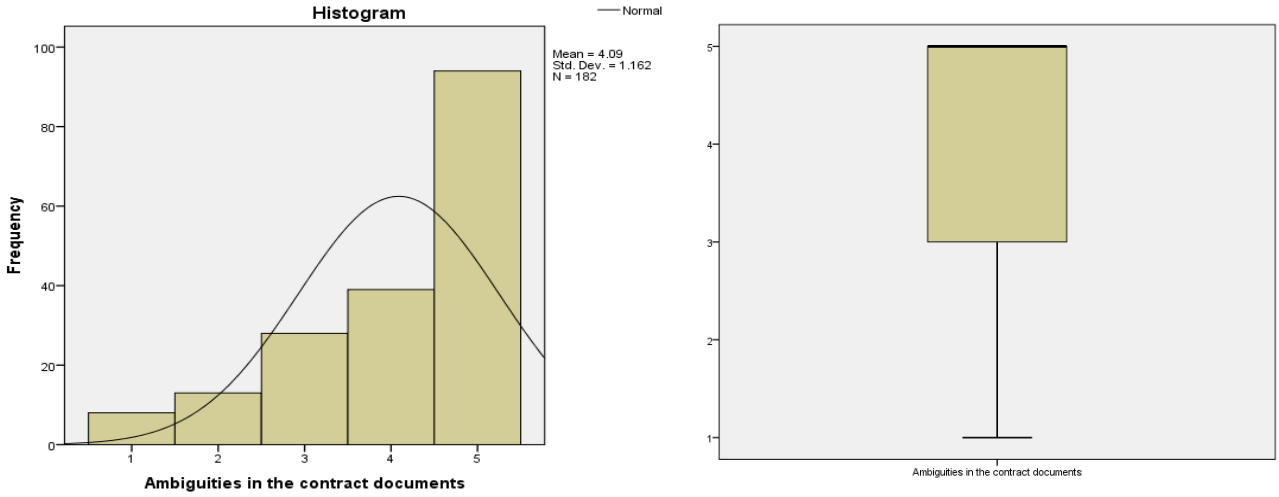


Figure 23. Ambiguities in the contract documents

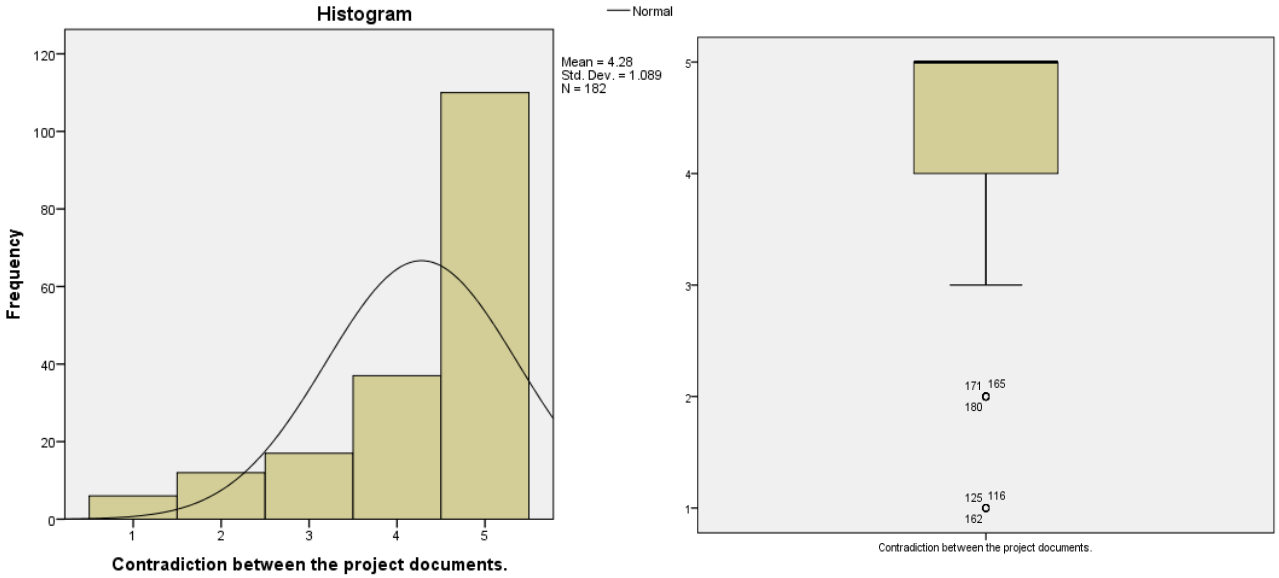


Figure 24. Contradiction between the project documents

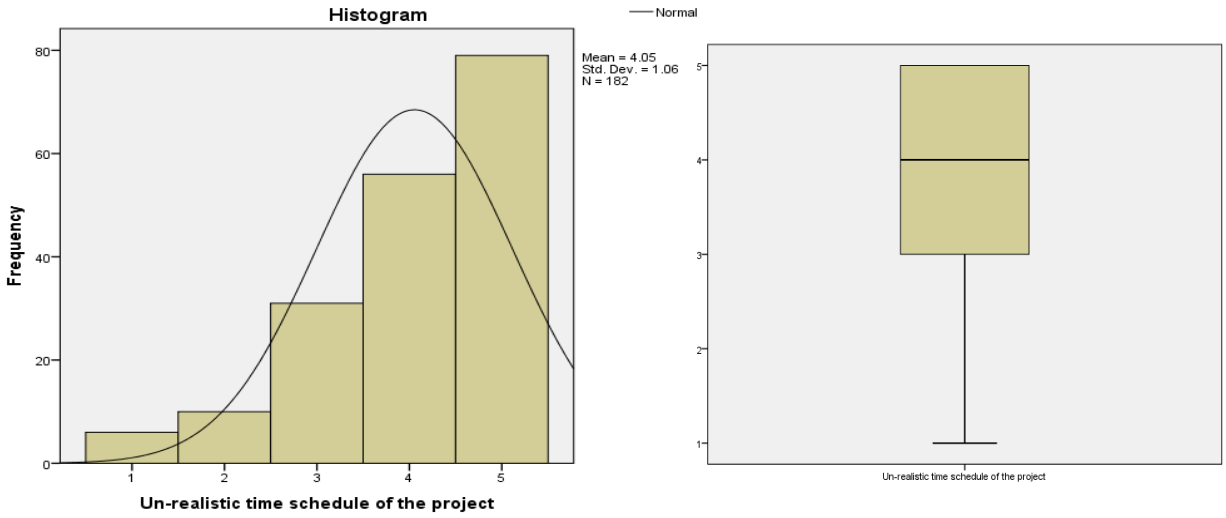


Figure 25. Un-realistic time schedule of the project

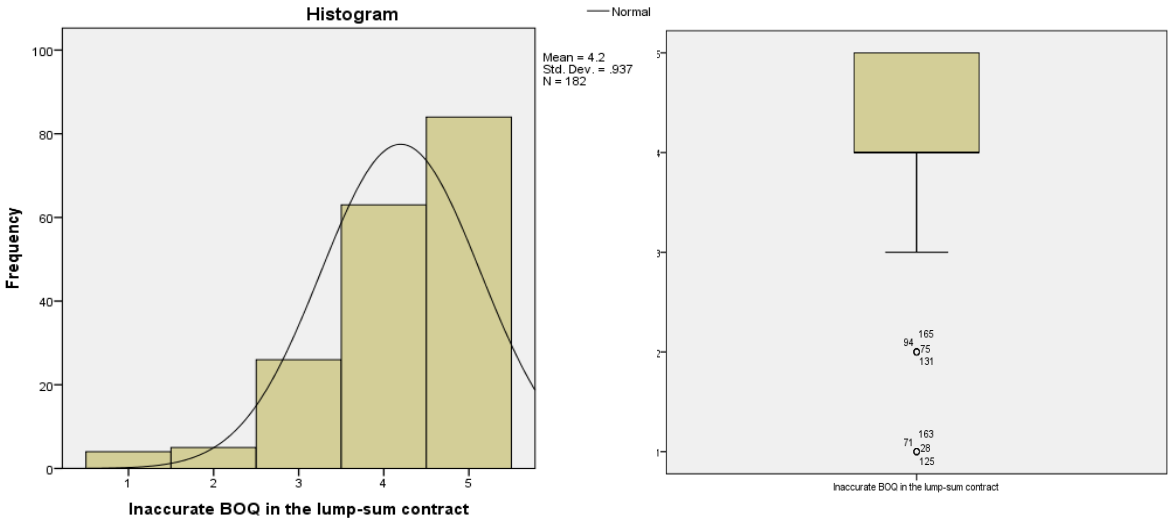


Figure 26. Inaccurate BOQ in the lump-sum contract

From the analysis of all the contractors' main reasons of dispute, it is shown that the main reasons of dispute are limited to the following top factors:

1. Weakness in contract language and instrument:

Culture of the community has a big effect on wording of construction contract, like the fact that the American and English symbolize signing the contract as binding action between both parties; on other hand the Asiatic culture keeps reviewing the contract after the signature till the end of the project. Weakness in contract language and instruments takes many shapes, like:

- Negligence: This action is described when the contract clauses are negligently and improperly addresses the activities of the contract with all the related conditions and terms that regulated the work.
- Exclusion of essential or necessary elements: any missed terms or conditions in the contract would be considered as a main source of dispute, and weakness of contract drafting.
- Abusive wording: In simple description of the abusive wording of contract, it can be defined to be drafting the contract with favor the interest of one side, usually the side with the strong economic situation or who is paying for the project is the one who is pushing for this type of weakness of contract language. [30]
- In-accurate choice of wording: sentences that logically contradicting each other, or refer the reader to another citation that contradicts the contract is a part from the weak language of contract.
- Wording of the contract is not in the native language of the country.

To avoid such mistakes in contracting, some proposed to standardize the construction (like the governmental ministries) but this action has advantages and disadvantages. As an advantage, avoiding the weakness in contract language and instruments, increase the efficiency, certainty and risk mitigation. However, some of the disadvantages are: it does not allow any variations in contract to adapt to the special situations of the project, prohibits the innovation. Finally, drafting the contract cannot be automated but it is somehow an art.

Therefore, contractors prefer the contract language without any vocabulary that might be misinterpreted between the parties of a contract, to avoid any dispute in the future, in addition to avoid the extra time and cost generated due to this misinterpretation.

2. Change in the item description and quantities in the BOQ:

In the project preliminary stages, the architect/engineer prepares a preliminary project cost based on area, function, volume, or any other measuring unit. Based on this estimation, the owner establishes a reference bench price for the project, with a margin of accuracy.

If the quantity or the design of the project has been changed from what is estimated, then it will be reflected on the cost and the time of project execution.

Due to the furious competition between contractors, sometimes they follow a bidding strategy based on low quantity of items, knowing that there will be a variation claim in these items depending on the project type of contract.

3. Inaccurate specifications of items:

Item specification consist of many sub-clauses that covers general description and function of the item.

As an attempt to reduce the inconsistency of item specification in the project, it is frequently recycled from one project to another without any attention to the

uniqueness of the project systems and the integration between them. Despite the standardization of the specification minimizes the un-accurate wording to specify the items, and eliminate the chances of disputes, it has also a disadvantage like the wording added by the owner to the specification are mostly the source of dispute.

Sentences similar to these in specification "contractor is the sole responsible for the means and methods of the construction" is a very spacious and ambiguous sentence that can cause dispute between the owner and the contractor, though it is widely known in practice, that the project requirements is the responsibility of the contractor, dictated by the owner, and if any problem occur related to specifications, then it would be argued to be taken care of by the owner in terms of cost and time [38]

Potential situation that might happen in the project because of inaccurate specification:

- End product is not satisfactory
- Product cannot be constructed by the specified method.
- Incorrect terminology and referencing.
- Specification prepared without referring to what the contract includes. [40]

Contractors because of all the specification variance in cost between the described items, inconsistent specification of the items and obsoleteness of the item from the market considers the specification of the items very important.

4. Ambiguities in the contract documents:

Contract documents are a set legal document that forms all together the reference to the project quality, time, cost, and set point for any tangible or intangible component of the project. Accordingly any miss-interpretation in these documents is a ligament reason for dispute. It affects directly the aforementioned factor in the project cycle.

5. Contradiction between the project documents:

As a continuation to point number 4, if there is a contradiction between the project documents, then the reference for the contractor will be confused between these set of document.

Contractors tends to go for the easiest and the cheapest option in the contradiction between the project documents, which might go against the designer perceptions of the project, and against the owner desire and vision for the project, creating a source of dispute between the contract parties to go for which reference.

6. Sizable variation orders that exceeds the maximum allowed percentage in the standard contract:

Legally, the variation order is the agreement to alter the scope of contract within the contract frame and boundary, but in construction it might be defined as the alteration of the scope of work in the form of addition, omission or substitution from the original scope of work.

Variation is a common thing in constructions due to human nature of human seeking perfection and improvement, but what must happen is minimizing the variation as much as possible by generating complete and clear documents, and by avoiding dispute resulting from variation.

Variation may include alteration of design, quantities, quality, working conditions, sequence of work, and alteration of project time schedule by the owner. Clarifying the contract documents should be done in a way that does not affect any of aforementioned points.

There are some situations where the variation might occur without the consent of the contractor, like any instructions after the completion of the work, omission of any

work that can be done by another contractor and instructing the contractor of any work that is subjected to prime cost sum. [29]

It is demonstrated that the variation might be added to the contractor account without his approval or might be with his approval, but it would alter the original scope of the project causing extra time and cost.

Due to the limitation of the funding options in Saudi construction market the owner tends to limit the project total cost, and his greedy nature seeks to start receiving the profit on investment at earliest, justifying the denial of any variation claim, which may trigger the dispute.

7. Un-realistic time schedule of the project:

The eagornace of the owner to start receiving the return of investment, forces the contractor to squeeze and crash the tasks period, to un-achievable period.

Consequences of the un-achievable schedule of the project affect both contracting parties; the owner by cutting corner and lowering the quality of the project, and the contractor over-run the cost because of the re-work, and spending more cost to crash the critical and non-critical tasks.

8. Interfering in the contract execution of the contract by the owner in extreme situations affecting the way:

According to the rules of the owner there is some decisions need to be taken by the owner, but this interferes in the project and limits the project scope and contract documents.

Owners have three main obligations toward the construction project

- Moral obligation: this is by keeping a safe, friendly work construction environment with all the interaction between all the departments and contractors.

- Legal obligation toward the governmental authorities to assist in keeping the contractor's rights, securing the required licenses and alert the unforeseen hazards in a proactive way.
- Potential saving by seizing any opportunity to save on the contractor and the owner any extra costs and adopt alternative saving method of construction.

In interfering in contract there are ups and downs, limited to the nature of interfering whether it is positive and pushes the project toward the completion within the scope and budget of the project, or negative and only picks the observation and highlight the flaws of the contractor.

9. Delay of response to the requested decisions by the owner:

In relation to interfering of owner in the project, is awaiting the requested decision by the owner to be able to continue in construction.

Project owner has a rule of coordination between all the contractors, arrange and secure the required licenses, and clarify the disputed scope of project to contractor directly or through participation in any arbitration session if required.

10. Low quality in administration processes:

Construction in general goes into multiple administrative phases that can be listed below:

- Pre-construction phase: such as design, development of plans and specifications, bidding, tendering, permits, schedules and budgeting.
- Initial construction phase: such ad site preparation, casting the foundations, structure of the building and roofing.
- Finishing phase: like mechanical and electrical works, interior finishing and Landscape.

- Post construction phase: like the testing and commissioning, completion inspection and handover.

During these processes close coordination and communication between the departments, contractors, and the owner takes place. Unless these communication and actions accordingly are taken into correct timely manner the project will go through a lot of disputes mainly faced by the contractors because they are spending and investing money and reputation in their project.

11. Inaccurate BOQ in the lump-sum contract:

Difference in quantity of any project component between the shop drawing and the BOQ causes the contractor more cost, without any compensation from the owner.

Extra cost of the project will be first compensated from the contractor profit, then flip to lose. That happened frequently because the bidding documents accuracy does not go up to a decent percentage that can be rely, and that is why the contractors consider these documents as a reference not as a complete source of the bidding and pricing solely.

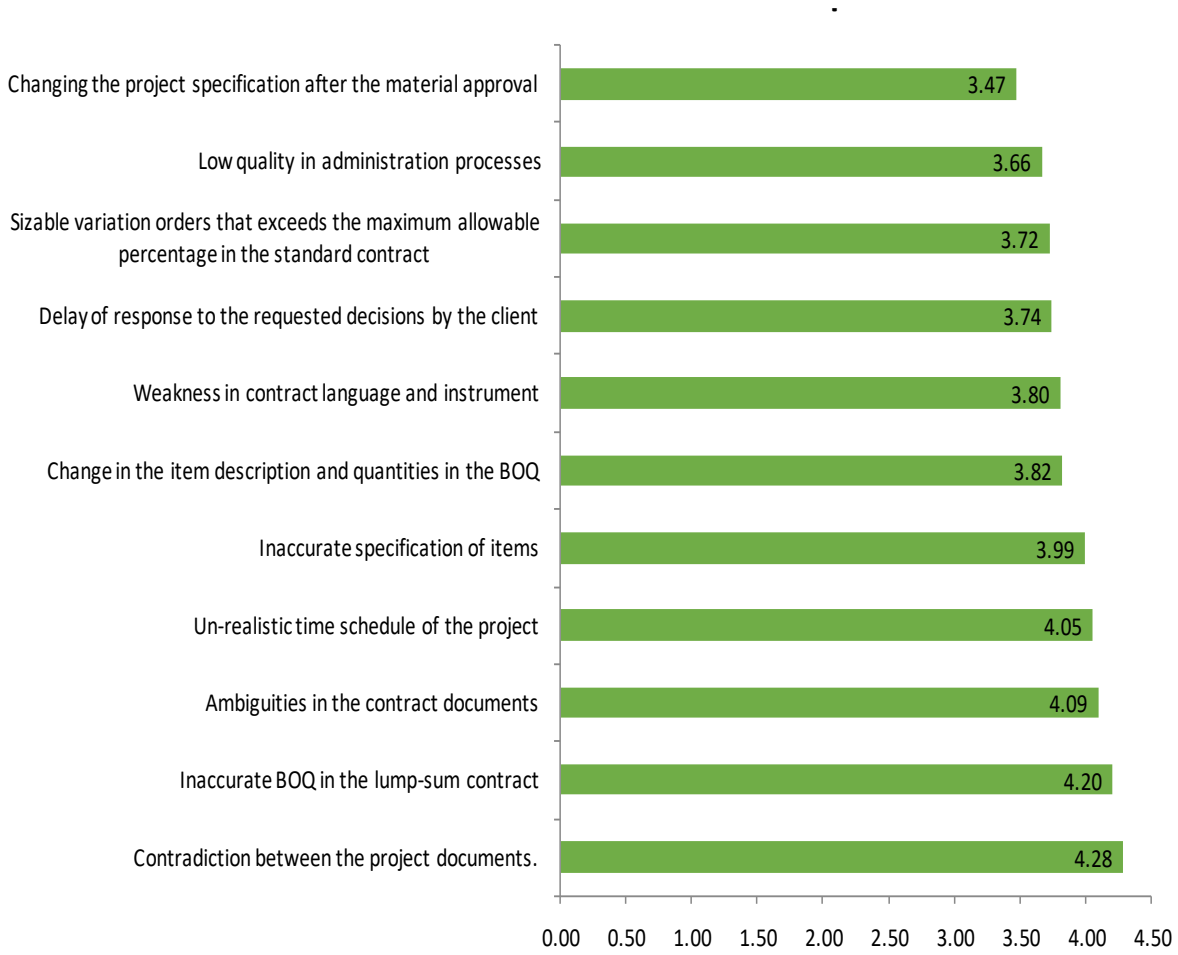


Figure 27. Common construction dispute factors

Comparison between first and second-Degree contractors' point of view for reasons of dispute:

TABLE 33. Main dispute factors from First Degree contractors point of view

S/N	Description	Average value of respondents	Standard deviation	P value of Z test	Is the value significant?
1	Weakness in contract language and instrument	3.365671642	1.100519664	5.99516E-09	Yes
2	Un-awareness of the governing rules in the appendixes	2.5178125	0.939057106	0.	No
3	Un-awareness of the governing rules that regulate the work in the country	2.43125	0.979615062	0.66666969	No
4	Un-awareness of the governing of the commercial regulations	2.775625	1.046060288	0.45678375909	No
5	Long period of project hold	2.244375	1.115279528	0.481999916	No
6	Un-awareness of the project milestones	2.7203125	0.975556322	0.981413977	No
7	Un-awareness of the stated construction method	2.7765625	1.007568553	0.603791458	No
8	Change in the item description and quantities in the BOQ	3.2921875	1.190487849	1.45221	No
9	Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work) contract.	2.365625	1.068058066	0.997764352	No
10	Inaccurate specification of items	3.7421875	1.198726974	1.23634E-07	Yes
11	Ambiguities in the contract documents	3.6984375	1.196055484	0.57162169	No
12	Contradiction between the project documents.	3.7921875	1.193790323	0.092721932	No
13	Mixing the lump-sum item and the unit-price items in the same contract	2.065625	1.007721176	1.01596	No
14	Changing the project specification after the material approval	3.161875	1.077690736	0.024511341	No
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	3.621875	1.076662787	4.64405E-06	Yes
16	Ambiguity in the project boundaries	2.771875	1.004786772	0.999889894	No
17	ambiguity in project responsibilities between the contractor and the client	2.3234375	0.995777255	0.933356769	No
18	Lack of Setting a reference for the disputes between the client and the contractor	2.253125	0.963405214	0.992751882	No
19	Un-realistic time schedule of the project	3.8203125	1.111384139	0	Yes
20	Delays in handing over the site to the contractor	2.4328125	0.962862315	0.999992001	No
21	Interfering in the contract execution of the contract by the client in severe affecting way	3.984375	1.218879334	0.000108516	Yes
22	Delay of response to the requested decisions by the client	3.8359375	1.066876697	0.000183702	Yes
23	Un-skilled contractor workers	2.875	1.136370795	0.893342218	No
24	Shortage of the skilled workers in the labor market	2.6671875	1.138939234	0.90646549	No
25	Sizable sub-contractors and out-sourcing	2.875	1.101180469	0.900476333	No
26	Error in developing the bidding such as estimation	2.625	0.930667359	0.999997427	No
27	Lack of quality	2.6203125	1.680292675	0.971508567	No
28	Low quality in administration processes	3.159375	1.002444713	0.726391526	No
29	Fault negotiation procedure between the parties	2.190625	0.868943382	1	No
30	Inaccurate BOQ in the lump-sum contract	3.896875	0.079239401	3.33067E-16	Yes

The dispute factors that is responded only by the first degree contractors are:

- Weakness in contract language: this factor is only stated by the first Degree contractors, which could be caused by the side who prepared the contract documents, who have not been trained well to make contracts drafts for projects handled by profissional contractors.

Recycling and standardizing the contracts is part of the solution to avoid missing any part of the scope, but each project has its own conditions and standards that need to be taken into consideration.

Contract administration is a vital factor for project successfulness as highlighted by a lot of prestigeous research organizations and management consultations like ARCADIS.

Construction industry is very dynamic, and lots of inputs and outputs are going from/to each activity. Unless those inputs and outputs are controlled, and requirements are monitored, disputes will rise-up, causing severe delay and budget over run.

Contractors from first Degree noticed that low quality in administrative process may be due to the fact that qualified engineers and personnel are immigrating back to their home countries.

- Sizable variation orders that exceeds the maximum allowable percentage in the standard contract:

One of the dispute among the first Degree contractors is this factor. Variation provision in contracts is usually provided in articles, with citation for the price referencing of any additional items. Dispute happens between the contractor and the owner when the variations in one project occurs more frequently, and the evaluation of these variations exceeds the usual agreed-on percentage form the total project value.

Doubt will be focused on the contractor at first to justify the variations, and proof that they are real and are not submitted just to cover any other loss in the project.

Secondly, the design and the supervision teams will advise regarding the quality of design, and to verify the variation.

Unsuitable quality of design, with missing of recorded information, delays the project and lead to sizable variations ending uo with tedious work progress to all the stakeholders.

- Interference in contract execution by the client in severe affecting way:

Again, one of the dispute factors among the first degree contractors is when the owner interfering in project. Owner participation in project is not always un-preferred; on the contrary, it might be beneficial and needed. What makes the difference is the behavior of the owner. First and second-Degree contractors observed that owner's participation in project execution is usually in a bad manner, which negatively affects the project.

- Delay of response to the requested decisions by the client:

Construction industry is dynamic, continuously moving sector, and to manage the industry it is a must to work in an organized timely manner.

Delay in responses and decisions that are needed from the owner, delay in responses does not support the industry, and it is a main factor for dispute remarked from the contractors.

Owners are needed to be trained more, to act efficiently in a timely manner, avoiding panic and to be up to the challenges in construction, otherwise lots of accumulated disputes will be piled in front of them, and the owner will be part of disputes factor.

The common dispute factor between the first degree and the second degree contracors are:

- Inaccurate specification of the items:

This factor is also shared between the first Degree and the second Degree contractors as a main factor for dispute. Specification is the reference for project's quality. Material and equipment in the construction is a major component in construction, therefore any ambigous specification of material quality and dedscription will be reflected on the total cost of the project, despite the contractor qualification or capabilities.

In the constrction market in Riyadh it is noticed by first and second Degree contractors that inaccurate specification of the items is faced a lot in the projects, which could be due to weakness of the engineer who prepared the material specification, or did not notice the integration between all the systems at the end of the project.

- Un-realistic time schedule of the project:

At the time of project bidding, a furious competition goes between the contractors to win the project. Contractors tends to compete in un-fair method, using false tempting schedule of the project. Delay of of handing over the projecct to the owner causes a loss of return on investment.

- Inaccurate BOQ in the lump-sum contract:

This factor affects the first and second degree contractors, because many of their signed contracts are lump-sum contracts, needless to mention that the material quantity and quality in projects are main component from the total project price.

First degree contractors handle huge projects, where the amount of raw material and equipment are massive. Any minor modification in the quantity has to be multiplied by the total project quantity, which will be a big source of dispute.

Second degree contractors does not have a wide margin for profit and capital to overcome the over planned cost occur in case of excess material during the execution of the project rather than the written in the BOQ.

Second Degree contractors have four unique factor of dispute other than the common factors shared with the first-Degree contractors, which is:

- Change in the item description and quantities in the BOQ:

Second degree contractors have this factor as a main factor for a dispute.

At the time of bidding and project financial estimation, the margin of accuracy is ±30%, and during the project execution, this accuracy percentage is enhanced. If the description, quality, and quantity have drastically been changed , then the project will be over budget.This scenario of in-accurate preparation of project document might happen in the time of preparation of BOQ.

- Ambiguities in the contract documents

Second degree contractors consider the ambiguity in project documents raises a dispute between the contractor and the owner, because of the different view and intrpetration of the project documents between the two parties.

Also, this confuses both of them because of the interset conflict, and the high expectation that the owner had for the project.

- Contradiction between the project documents:

AS for the contractor, Second degree contractors, the owner considers the contradiciton betweeen the project document a source of dispute, because he is not able to refer the contractor to a certain specific documents. Now this can go to escalation of a conflict or compromise of the full object of the project.

Contractors tends in all degrees to go for these contradicition to chance it for claim, increase their profit, and recover their delays using any execuse even if it is genuinue.

- Lack of quality:

Deviation of the end product from the designated specification and quality will cause rejection, and definitely a substantial work to correct the final product to reach the required level of the project outcome.

It is well-known that the shortage of qualified and skilled workers in Saudi market, especially in the second-Degree contractors' firms, forces the second-Degree contractors especially to depend on out-sourcing and hired manpower to continue the operations of this industry. Those rented manpower are not highly qualified, and cause a lot of low-quality work, which will need more money than the specified in the budget. Usually, this cost is the point of dispute between the contractor and owner.

TABLE 34. Main dispute factor from second Degree contractors point of view

S/N	Description	Average value of respondents	Standard deviation	P value of Z test	Is the value significant?
1	Weakness in contract language and instrument	3.285714286	1.016827634	0.751092	No
2	Un-awareness of the governing rules in the appendixes	2.420454545	0.897254108	1	No
3	Un-awareness of the governing rules that regulate the work in the country	2.414772727	0.915646816	1	No
4	Un-awareness of the governing of the commercial regulations	2.585227273	0.993468932	0.999999985	No
5	Long period of project hold	2.426136364	1.050278256	1	No
6	Un-awareness of the project milestones	2.676136364	0.933625109	0.999997908	No
7	Un-awareness of the stated construction method	2.840909091	0.954823707	0.98646264	No
8	Change in the item description and quantities in the BOQ	3.602272727	1.247074499	7.41881E-11	Yes
9	Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work) contract.	2.551136364	0.995819182	0.999999999	No
10	Inaccurate specification of items	3.698863636	1.230655511	0.24475E-04	Yes
11	Ambiguities in the contract documents	3.880681818	1.243254527	0	Yes
12	Contradiction between the project documents.	4.090909091	1.201297999	0	Yes
13	Mixing the lump-sum item and the unit-price items in the same contract	2.3125	0.937511905	1	No
14	Changing the project specification after the material approval	3.119318182	1.037839289	0.063601958	No
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	3.272727273	1.033465988	0.231782534	No
16	Ambiguity in the project boundaries	2.727272727	0.952917598	0.999926743	No
17	ambiguity in project responsibilities between the contractor and the client	2.590909091	0.957811358	0.66666993	No
18	Lack of Setting a reference for the disputes between the client and the contractor	2.568181818	0.878901321	1	No
19	Un-realistic time schedule of the project	3.761363636	1.166134696	0	Yes
20	Delays in handing over the site to the contractor	2.664772727	0.872505721	0.3967328	No
21	Interfering in the contract execution of the contract by the client in severe affecting way	3.392045455	1.204631215	1.888009	No
22	Delay of response to the requested decisions by the client	3.380681818	1.094125399	1.95748265	No
23	Un-skilled contractor workers	2.75	1.066369006	0.999065208	No
24	Shortage of the skilled workers in the labor market	2.784090909	1.057748159	0.61885265	No
25	Sizable sub-contractors and out-sourcing	2.829545455	1.033403154	0.985673972	No
26	Error in developing the bidding such as estimation	2.630681818	0.941106699	0.999999904	No
27	Lack of quality	2.664772727	1.000632917	0.009995595	Yes
28	Low quality in administration processes	3.289772727	1.085545527	0.000199061	No
29	Fault negotiation procedure between the parties	2.357954545	0.829625952	1	No
30	Inaccurate BOQ in the lump-sum contract	3.857954545	1.119818515	0	No

-

- Comparison between national and international contractors' point of view for reasons of dispute:

TABLE 35. International contractors' main factors for dispute

S/N	Description	Average value of respondents	Standard deviation	P value of Z test	Is the value significant
1	Weakness in contract language and instrument	3.357	1.15	0.0277	Yes
2	Un-awareness of the governing rules in the appendixes	2.85	1.09	1	No
3	Un-awareness of the governing rules that regulate the work in the country	2.5	1.224	0.094	No
4	Un-awareness of the governing of the commercial regulations	2.785	1.31	.028	Yes
5	Long period of project hold	2.71	1.06	1	No
6	Un-awareness of the project milestones	3	1.24	0.96	No
7	Un-awareness of the stated construction method	3.27	1.05	0.99	No
8	Change in the item description and quantities in the BOQ	4	.96	0.00009	Yes
9	Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work) contract.	3.214	1.3	0.9999	No
10	Inaccurate specification of items	3.64	11.215	.06	No
11	Ambiguities in the contract documents	4.07	1.14	0.0027	Yes
12	Contradiction between the project documents.	3.85	1.36	0.00218	Yes
13	Mixing the lump-sum item and the unit-price items in the same contract	3	1.3	0.9999	No
14	Changing the project specification after the material approval	3.42	1.28	0.4837	No
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	3.357	1.15	0.127	No
16	Ambiguity in the project boundaries	2.85	1.099	0.9999	No
17	ambiguity in project responsibilities between the contractor and the client	3.214	1.127	0.9999	No
18	Lack of Setting a reference for the disputes between the client and the contractor	2.78	.974	1	No
19	Un-realistic time schedule of the project	3.85	.6629	0	Yes
20	Delays in handing over the site to the contractor	3.07	.9167	0.9999	No
21	Interfering in the contract execution of the contract by the client in severe affecting way	3.714	1.06	0.0642	No
22	Delay of response to the requested decisions by the client	3.0714	0.916	0.9999	No
23	Un-skilled contractor workers	3.85	1.0694	0.064	No
24	Shortage of the skilled workers in the labor market	3.21	.763	0.9999	No
25	Sizable sub-contractors and out-sourcing	3.5	.8117	1	No
26	Error in developing the bidding such as estimation	3.6	.754	3.271	No
27	Lack of quality	3.6	.854	1	No
28	Low quality in administration processes	3.27	0.94	0.999999	No
29	Fault negotiation procedure between the parties	3.5	1.019	0.398	No
30	Inaccurate BOQ in the lump-sum contract	3.85	1.027	9.775E-05	Yes

- Weakness in contract language and instrument:

It is the dispute factor highlighted by the international companies, which might be due to non-international standard of contracts used by the owners. Many contractual disputes arise from different opinions in understanding the contract terms against what the contract means. That is why the contract terms should be interoperable to certain true common meaning to avoid any dispute.

International contractors considered this factor as a major dispute that may occur due to the complex project they are handling with lots of systems and integration and control over the whole building. Projects with capital of multi-millions need to have an accurate, clear, easy to understand wording or terminology in the documents to avoid dispute because of multiple interpretation for the same sentence.

- Un-awareness of the governing of the commercial regulations:

International contractor still are not familiar with the commercial rules, and the banking in the Saudi market, which might be refer to the non-standard issuance of the compensation monetary for the executed work, delay of payments, and limited funding resources in the Saudi market.

- Change in the item description and quantities in the BOQ:

Changing the description and quantities of the items from the BOQ causes the project to over-run the cost, which is common between all the contractors from all the classifications and spectrum.

- Ambiguities in the contract documents

Saudi construction market uses the English language as a second language, and the official governmental language is Arabic, which might put the international contractors in confusion for the meant explanation of the contract wording.

- Contradiction between the project documents.

In continuation to the previous point the international contractor fall in the contradiction between the projects documents, because they do not use the Arabic language as a first native language.

- Un-realistic time schedule of the project:

International contractor are seems to go for the specialized, sophisticated projects, which is not experienced to the local owners. These projects are to be studied well to estimate its period. Lack of study for this specialized project might be the reason why the international contractors are facing un-realistic project time schedules.

- Inaccurate BOQ in the lump-sum contract:

As the all the spectrum of contractors, increasing the quantities in project over the stated quantity in the BOQ increases the project cost, and reduce the benefit of the contractor.

International contractor might be not familiar with the big margin on difference between the BOQ and the shop drawing.

Table 36. National contractors main factors for dispute

S/N	Description	Average value of respondents	Standard deviation	P value of Z test	Is the value significant ?
1	Weakness in contract language and instrument	3.27	1.014	0.000119	Yes
2	Un-awareness of the governing rules in the appendixes	2.42	0.897	1	No
3	Un-awareness of the governing rules that regulate the work in the country	2.91	0.915	1	No
4	Un-awareness of the governing of the commercial regulations	2.58	0.993	1	No
5	Long period of project hold	2.755	1.050	1	No
6	Un-awareness of the project milestones	2.637	0.933	0.999998	No
7	Un-awareness of the stated construction method	2.74	0.955	0.986463	No
8	Change in the item description and quantities in the BOQ	3.632	1.247	7.42E-11	Yes
9	Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work) contract.	2.551	0.995	1	No
10	Inaccurate specification of items	3.69	1.230	0.7642	No
11	Ambiguities in the contract documents	3.880	1.243	0.25964	No
12	Contradiction between the project documents.	4.09	1.201	0.43687	No
13	Mixing the lump-sum item and the unit-price items in the same contract	2.3125	0.937	1	No
14	Changing the project specification after the material approval	3.119	1.037	0.063602	No
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	3.27	1.033	0.000232	Yes
16	Ambiguity in the project boundaries	2.296	0.952	0.999927	No
17	ambiguity in project responsibilities between the contractor and the client	2.59	0.957	1	No
18	Lack of Setting a reference for the disputes between the client and the contractor	2.568	0.878	1	No
19	Un-realistic time schedule of the project	3.76	1.166	0	Yes
20	Delays in handing over the site to the contractor	2.66	0.872	1	No
21	Interfering in the contract execution of the contract by the client in severe affecting way	3.39	1.204	7.89E-06	Yes
22	Delay of response to the requested decisions by the client	3.58	1.094	1.96E-06	Yes
23	Un-skilled contractor workers	2.12	1.066	0.999065	No
24	Shortage of the skilled workers in the labor market	2.487	1.057	0.996615	No
25	Sizable sub-contractors and out-sourcing	2.825	1.033	0.985674	No
26	Error in developing the bidding such as estimation	2.27	0.941	1	No
27	Lack of quality	2.195	1.26	0.999996	No
28	Low quality in administration processes	3.183	1.085	0.000199	Yes
29	Fault negotiation procedure between the parties	2.234	0.825	1	No
30	Inaccurate BOQ in the lump-sum contract	3.432	1.119	0	Yes

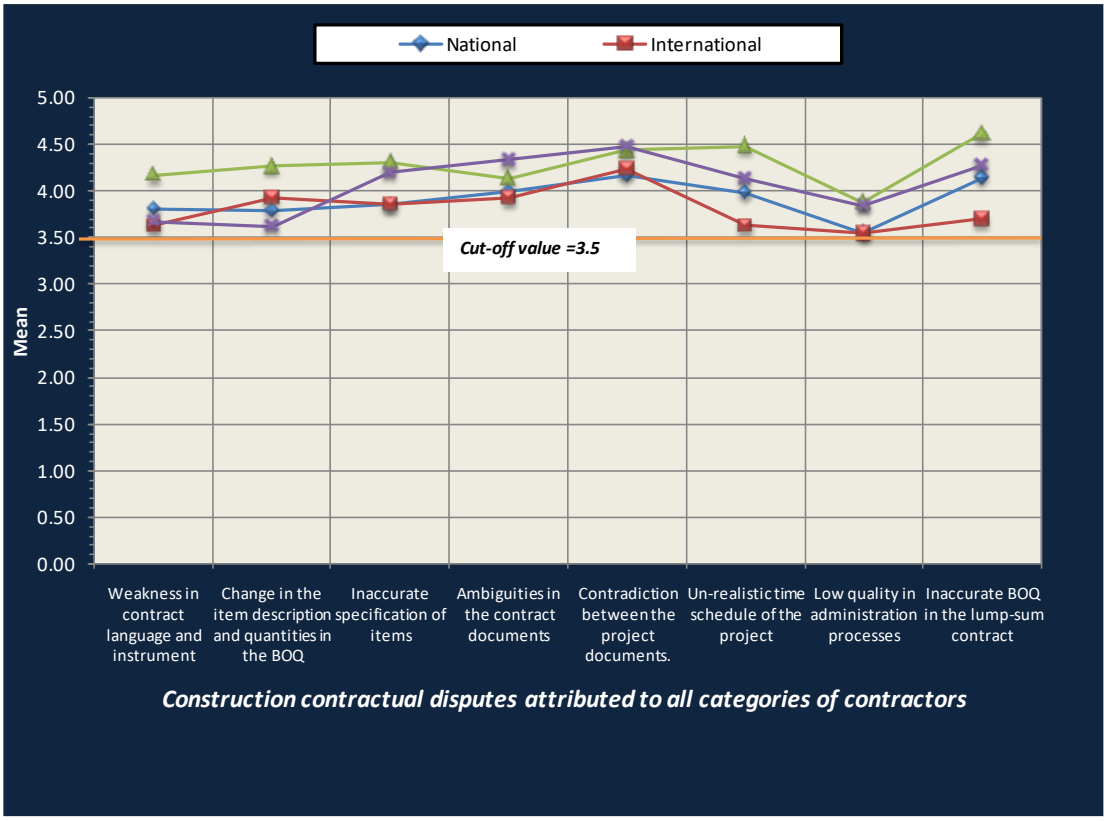


Figure 28. Comparison between types of contractor's main factor of dispute

4.2.2 Reasons of Dispute from the Owners points of view:

We in this study divided the owners into two categories: private and governmental. Study of the dispute factors from the point of view of each of them will follow.

4.2.2.1 Private owners' point of view for reasons of dispute

Table 37. Major dispute factor from the point view of private owner

S/N	Description	Average value of respondents	Standard deviation	P value of Z test	Is the value significant
1	Weakness in contract language and instrument	3.43	0.887	0.75	No
2	Un-awareness of the governing rules in the appendixes	3.217	0.95	0.987	No
3	Un-awareness of the governing rules that regulate the work in the country	3	1.058	0.999	No
4	Un-awareness of the governing of the commercial regulations	3.211	0.95	0.988	No
5	Long period of project hold	3.04	1.023	0.999	No
6	Un-awareness of the project milestones	3.152	0.888	0.988	No
7	Un-awareness of the stated construction method	3.26	0.87	0.982	No
8	Change in the item description and quantities in the BOQ	3.69	1.074	0.19	No
9	Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work) contract.	3.13	0.977	0.932	No
10	Inaccurate specification of items	4.0434	1.059	0.0008	Yes
11	Ambiguities in the contract documents	4.456	0.8025	2.12E-14	Yes
12	Contradiction between the project documents.	4.391	0.909	2.11E-10	Yes
13	Mixing the lump-sum item and the unit-price items in the same contract	2.13	0.98	1	No
14	Changing the project specification after the material approval	3.26	0.91	0.964	No
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	3.58	0.86	0.302	No
16	Ambiguity in the project boundaries	3.29	1.12	0.947	No
17	ambiguity in project responsibilities between the contractor and the client	2.826	1.14	0.9999	No
18	Lack of Setting a reference for the disputes between the client and the contractor	3.086	1.049	0.995	No
19	Un-realistic time schedule of the project	4	0.9877	0.0011	Yes
20	Delays in handing over the site to the contractor	2.869	0.899	0.9999	No
21	Interfering in the contract execution of the contract by the client in severe affecting way	3.56	1.0865	0.289	No
22	Delay of response to the requested decisions by the client	3.34	0.9358	0.83	No
23	Un-skilled contractor workers	3.5	0.74	0.422	No
24	Shortage of the skilled workers in the labor market	3.456	0.88	0.564	No
25	Sizable sub-contractors and out-sourcing	3.369	1.1	0.75	No
26	Error in developing the bidding such as estimation	2.869	0.9055	0.999	No
27	Lack of quality	3.32	0.958	0.869	No
28	Low quality in administration processes	3.63	1.0714	0.0587	No
29	Fault negotiation procedure between the parties	2.5869	0.9385	1	No
30	Inaccurate BOQ in the lump-sum contract	4.0869	1.080	0.00039	Yes

Private owners identify the following factors to be the major dispute factors from their point of view:

1. Inaccurate specification of items: it seems also from this factor that the private owner emphasizes again on the weakness of the team who prepare the project specification and BOQ, because it is the responsibility of the engineer to create accurate specifications for the items that will be used in the project.
2. Ambiguity in the contract documents: As an extension to same preparatory of the project BOQ, engineer has a flaw in preparing clear contract document, which can be seen from the big range of project tendering, and disputes during the execution on the administration processes.
3. Contradiction between the project documents: The discrepancy in contract documents means the difference in the requirement between the referred standard and the specifications and variance between the project document itself, which might indicate the lack of knowledge of the standards related to the scope of the work from the owner and contractor side, or it might indicate the lack of coordination and inaccuracy between the given documents to the contractor to extend the available structure and the ground facts.
4. Un-realistic time schedule of the project: Private owners tend to complete the project on the shortest time, but it is noticed that around 40% from projects in the study area are not. Private owner must have the project completed to start receiving profit out of the investment. The partial benefit seems to be not-understood properly by the contractors and the owner towards the completion of the project, which at the end weakens the trust in the contractor, and thus triggers the disputes.

5. Inaccurate BOQ in the lump-sum contract: Preparation of the project documents including the accurate quantity of the project, especially in lump-sum contracts, is a crucial matter that will reduce the submissions of the variation orders and accordingly the disputes. Private owners highlight this factor frequently due to the importance and legitimate of this simple request.

4.2.2.2 Governmental ministries' point of view for reasons of dispute:

We studied the main factors for dispute in this sub-chapter; to identify the major main reasons for dispute and to try to explain why these factors are considered the major points from governmental ministries' point of view.

TABLE 38. Governmental ministries main dispute factors

S/N	Description	Average value of respondents	Standard deviation	P value of Z test	Is the value significant ?
1	Weakness in contract language and instrument	4.2	1.14	0.004	Yes
2	Un-awareness of the governing rules in the appendixes	2.08	1.23	0.9999	No
3	Un-awareness of the governing rules that regulate the work in the country	2.92	1.311	0.98	No
4	Un-awareness of the governing of the commercial regulations	3.92	1.302	0.114	No
5	Long period of project hold	1.76	1.19	1	No
6	Un-awareness of the project milestones	3.48	1.504	0.47	No
7	Un-awareness of the stated construction method	3.4	1.339	0.34	No
8	Change in the item description and quantities in the BOQ	4.4	1.027	3.77E-05	Yes
9	Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work) contract.	1.56	0.94	1	No
10	Inaccurate specification of items	4.2	1.179	0.005	Yes
11	Ambiguities in the contract documents	4.04	1.26	0.04	Yes
12	Contradiction between the project documents.	4.32	1.096	0.0004	Yes
13	Mixing the lump-sum item and the unit-price items in the same contract	2.28	0.998	0.999	No
14	Changing the project specification after the material approval	4.24	1.23	0.004	Yes
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	4.25	1.085	0.00076	Yes
16	Ambiguity in the project boundaries	2.12	1.47	0.9999	No
17	ambiguity in project responsibilities between the contractor and the client	1.92	1.72	0.9999	No
18	Lack of Setting a reference for the disputes between the client and the contractor	1.84	1.37	4.12E-07	Yes
19	Un-realistic time schedule of the project	2.24	1.15	0.9999	No
20	Delays in handing over the site to the contractor	4.08	1.314	0.034	Yes
21	Interfering in the contract execution of the contract by the client in severe affecting way	4.32	1.176	0.000959	Yes
22	Delay of response to the requested decisions by the client	2.44	1.8	0.9935	No
23	Un-skilled contractor workers	2.56	1.69	0.988	No
24	Shortage of the skilled workers in the labor market	2.4	1.533	0.998	No
25	Sizable sub-contractors and out-sourcing	2.13	1.6224	0.999	No
26	Error in developing the bidding such as estimation	3.92	1.366	0.12	No
27	Lack of quality	2.17	1.57	0.999	No
28	Low quality in administration processes	3.89	1.23	0.0072	Yes
29	Fault negotiation procedure between the parties	3.46	1.39	0.52	No
30	Inaccurate BOQ in the lump-sum contract	4.44	1.117	6.64E-05	Yes

1. Weakness in contract language, terminology and instrument: contractors and governmental ministries are sharing this factor of dispute. Though the standard contract of the governmental ministries governs relationship between the governmental ministries and the contractors, but this might be the reason of the dispute because this contract does not consider the special conditions of the project.
2. Change in the item description and quantities in the BOQ: This factor of dispute is considered a major factor for dispute in all spectrums of experts in the construction industry. This factor indicates a serious issue of preparing the project BOQ. It is possible to miss and add some items in the BOQ during the preparation of the project documents, but what is obvious from the answers of the construction stakeholders that the omission and addition of items are creating more disputes in the project, which might be justified accordingly.
3. Inaccurate Items Specification: This is also considered a common dispute factor by both the governmental and private owners and the contractors. That question was repeatedly raised about the competency of the team who prepare the specification of the project and the un-efficient recycling of project specification from one project to another.
4. Ambiguity in the contract documents: This factor is considered a major one by the point view of all owners (governmental and private). Ambiguity of contract document is not limited to abusive wording or terminologies and un-fair conditions, it is extended to contract wording that can be understood misleadingly, which creates a dispute regarding the scope of project.

5. Contradiction between the project documents: This factor is responded solely by the governmental ministries. Referral to another standard in the project specification that is not suitable for the systems in the project, specifying an item in the project that is obsolete and cannot be integrated with other systems in the project and providing inaccurate As-Built for the infra-structure is only samples for the contradictions of project documents. This might be justified by the lack of full study for the documents needed for the project prior the invitation for bidding.
6. Changing the project specification after the material approval: This dispute factor is extremely highlighted by the governmental ministries only. Specifying material to be used in the project such as being available in the market and suitable to the function of the project, which is not the accurate practice by the team preparing the project specification, because the material will be changed during the execution of the project causing raise in the project cost and a dispute.
7. Sizable variation orders that exceed the maximum allowable percentage in the standard contract: This factor is common among all the experts participated in this study. Governmental ministries are framed with the standard contract format, and therefore they do not have the flexibility to add a provision for the variation in the contract.
8. Lack of Setting a reference for the disputes between the client and the contractor: In governmental work contracts the reference for the resolving the dispute goes always officially through the court , which increase the difficulties in resolving the dispute at the earliest stages.

9. Delay in handing over the job site to contractor: It seems that the handing over the site to contractor in the governmental ministries is taking too much time, where then the prices of items and goods are fluctuating.
10. Deep interfering in the contract execution by the client in a negative way: This is a main dispute factor that is identified by all participants. Reviewing and monitoring board of the governmental ministries who are not familiar with proper management to steer the project properly toward completion is the reason that might be behind this dispute factor.
11. Low quality of administration processes: This factor is also a major factor of dispute between all the construction stakeholders. Organization of all the administration processes is one of the important factors for the successes of the project. Routine procedure would standardize the administration process and could eliminate this factor. Miss-match between the contractor's procedure of administration process with the governmental ministries could be the reason for this dispute.
12. Inaccurate BOQ in the lump-sum contract: Last common factor for dispute expressed by all participants is this factor. Governmental ministries are facing this dispute factor in projects that might be due to the incompetent team preparing the BOQ of the project.

4.3 Source of Dispute

Source of dispute refers to the nature of dispute, where the researcher classifies the nature of dispute into four categories: financial, managerial, construction and contractual reasons. Classification of the dispute factors discussed in the previous text has been studied again by us and classified accordingly. In addition to the direct question to the respondents about the main source of dispute. Those reasons are the core reasons for the dispute in any construction project.

Answers to the direct question asked to the respondents are discussed in the following sub-chapter, to study the most repetitive sources of the dispute and to compare these sources between all the respondents' categories and the global dispute sources.

4.3.1 Source of dispute from the contractors' point of view

Main source of dispute usually is not due to a single reason, which is due to the complexity and dynamic nature of the construction industry during the last few decades.

From this point, the respondents of contractors stated that the main source of dispute is a combined source with a percentage of 71.54%. This complexity of dispute source has a variance of combination and sources that will be demonstrated next.

Table (39) shows that the dispute reasons from the point of all contractor’s point of view, is due to a combination of reasons with a percentage of 71.54%, The combined root of dispute was listed in the questionnaire.

One of the highly combined reasons of the dispute is related to financial issues and to the contract. As indicated from the percentage of respondents answered the questionnaire that this is the nature of dispute with a percentage of 29%. These two reasons are governing the two main aspects of construction; first the financial issues because it is the core interest of all parties to get the profit, and second, is the contract because it organizes the relationship between the stakeholders in construction.

Out of contractors' responses, 17.2% stated that the main source of dispute is contract and management. Where the management is the key factor for success in all life aspects, including the management of the construction contract. This is the highest percentage of a combined source of dispute between the contractor and the owner reflecting that there is a big miss-conception in managing the contract, and the style of management from the contractor's side, that leads to dispute and may be a failure in the construction of the project.

A percentage of 16.1% of the responses shows that the main source of dispute is due to construction and contractual, which takes almost the same weight and importance of the contractual and management of the project. What is meant here by the construction is the re-work, quality of the deliverables, completing the project on schedule and properly documenting the executed work. All mentioned points express the importance of the construction activities in the disputes, because after all it is all about the construction.

Management and finance are a crucial combination that helps the project to success, because it seems that it is one of the factors that determine the project management style and the pattern of dispute initiating, negotiation and solving of the dispute. A

percentage of 11.8% of respondents stated that this is the most important nature cause of dispute.

A percentage of 9.6% from the respondents stated that the nature of the dispute is finance and construction. This combination was less important because the construction seems controllable in the first and second-Degree contractors with their long experience and familiarity of constructing super-sized and complex projects.

Financial, management, construction and contractual nature of dispute reported by the contractors have had percentage of 5.3%. Those are all the disputes proposed by the researcher.

All the dispute reasons seem hardly to be gathered in one project, because project goes in difficulties starting from feasibility study of the project going through the construction, ending up with handing over the project.

Contractors of our study scope reported that that finance, management and contract dispute nature are the reasons behind the disputes faced in the projects they participated in. Contract and financial issues are commonly faced but the addition of management with the previous reasons may rise-up because of migration of the skilled engineer in construction market during the last few years. After all these combined reasons nature of dispute is placed in lower ranking (as shown from the response percentage of 5.3%) that could be due to the rare of occurrence in construction.

Despite the repetitive responses only 4.3% of the responses stated that the nature of dispute is due to financial issues, construction and contract. Combination of all those natures may be lowered in controlled construction at the highly prestigious and qualified contractors.

It is shown that only 5.3% of respondents replied that the nature of disputes is due to construction and management. This minority of nature of dispute could be due to the experienced of managing board of the first and second Degree contractors.

The remaining 1% of responses is due to construction, management and contractual may be because the competency of the first and second-Degree contractors to overcome any of this combination, and only an odd situation of incidence occur in a specific project.

The single nature of dispute as a response from the entire contractor ranks the contract the highest, with a percentage of 11.54%. Educating and training the contractors is one of the important factors that improve the construction industry, but it might be the situation among the first and second-Degree contractors, especially after the immigration of the skilled manager from the Saudi Arabia construction market.

Financial issues of dispute ranked as the second single main nature of dispute between the client and the contractors. This nature of dispute impacts the other construction triangle (workforce, material and engineering), but it is ranked in the second place of importance because the management of contract includes the management of finance.

Single management nature of dispute, is ranked third with a percentage of 3.08% from all the respondents, is the management because the management includes all construction aspects, and the defects in the management leads to further disputes. Contractors classified disputes related to management in the third place because they are using a standard, tested and the best approaches of management.

The last 4.62% of respondents stated that the single nature of dispute refers to the construction with the least percentage. Cumulative experience within the firm might reduce the construction-based disputes to the minimum level.

TABLE 39. Combined root cause of dispute from point of contractor view

Reason of dispute	Respondents	Percent (%)
Disputes related to financial+ Dispute related to contract	27	29
Dispute related to contract + Dispute related to management	16	17.2
Dispute related to construction + Dispute related to contract	15	16.1
Disputes related to financial + Dispute related to management	11	11.8
Disputes related to financial + Dispute related to construction	9	9.6
Disputes related to financial +Dispute related to construction + Dispute related to contract + Dispute related to management	5	5.3
Disputes related to financial + Dispute related to construction + Dispute related to contract	4	4.3
Dispute related to construction+ Dispute related to management	5	5.3
Dispute related to construction +Dispute related to contract + Dispute related to management	1	1
Total	93	100

From all these results, it is obvious that the nature of dispute is in-line with ARCADIS dispute report, that the management of contract is the main reason, verified from the accumulative percentage of management nature reason of dispute reaching to 72.9%. The second aspect is the finance where the accumulative percentage of all combined responses is 60% for the value of money and human nature.

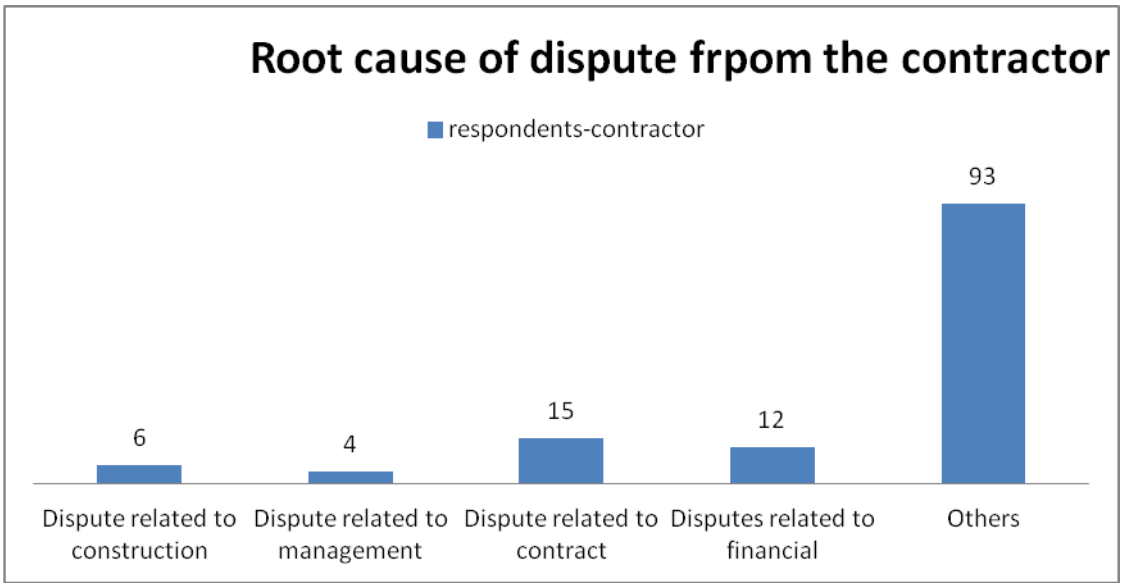


FIGURE 29. Root cause of dispute from the contractor point of view

- **Comparison between the first Degree and the second-Degree contractors root cause of dispute:**

First Degree contractors responded to the question of the root cause of dispute with the following responses and percentages:

Most of the respondents from the first-Degree contractors (58.06%) stated that the root cause of disputes is not a single reason or nature, because of the complexity of the construction field. These combinations are listed and discussed and detailed next.

The single root nature of dispute according to the first-Degree contractors are represented by 19.35% from a contract nature, this dispute is represented by the in-accurate BOQ in lump-sum contracts, and ambiguities in contract documents, and mixing the lump-sum items with the unit-cost items in the same contract of the project. On the other hand, the second-Degree contractors answered the contract nature of dispute were 4.41% percentage, which pulls the contract nature of dispute to the third

place. The difference between the significance of contract-nature dispute might be due to the average quantity of projects completed by the second-Degree contractors (less than 5 projects in general) and the average years of experience.

Financial-nature of dispute ranked in the second place to the first-Degree contractors with a percentage of 11.29%. The same ranking for the financial-nature of dispute is shown from the responses of second Degree contractors with a percentage of 7.35%, but the second-Degree contractors justifies the financial factor of the dispute that might be due to the smaller budget of the firms compared to the first-Degree contractors. These disputes are the cost of re-works, errors in developing the bidding documents at the second-Degree contractors.

In the third rank of dispute nature according to the first-Degree contractors is the construction. This could be due to difficulties in managing the contract and the financial issues in these firms, low quality in selecting materials and equipment suppliers (currently it is mostly based on price basis), lack of qualified consultant firms and flaws in the supply chain management which leads to cutting the edges and corners and consequently, affecting the construction quality and time schedules [32].

Lastly, is the management with a 3.23% from first-Degree firms' responses, and the second Degree agreed to this point with a nearer percentage (1.47%).

The combined root cause of dispute shows that the main combined nature of dispute is financial issues and contractual with a percentage of 33.3% from the total responses of the first degree contractors. Second Degree contractors' respondents are replying this combination factors with almost the same percentage (36.373%). Financial plan is a key-player, successful factor in project, and in case it is uncontrolled disputes will startup and continue through the whole project life cycle. Second-Degree contractors

have less and limited ability to fund the projects till the next payment un-like the first-Degree contractors.

Table 40. list of responses for the root cause of dispute from the 1st Degree contractors

Root cause of dispute	Number of respondents	Percent (%)
Combined	36	58.06
Disputes related to financial	7	11.29
Dispute related to contract	12	19.35
Dispute related to management	2	3.23
Dispute related to construction	5	8.06
Total	62	100

Table 41. Root cause of dispute from the 2nd Degree contractors' point of view

Root cause of dispute	Number of respondents	Percent (%)
Combined	57	83.82
Disputes related to financial	5	7.35
Dispute related to contract	3	4.41
Dispute related to management	2	2.94
Dispute related to construction	1	1.47
Total	68	100

Contract and management nature of dispute took the second rank according to the first-Degree contractors with a percentage of 19.44%, but the second Degree signifies it to the same rank but with a percentage of 25.45%. The difference in percentage might be referred to average experience of the second-Degree contractor management staff.

On the third rank, financial and management nature of dispute according to the first-Degree contractor with a percentage of 13.89%, but the second-Degree contractors signify this combination nature of dispute to the second place with almost the same

percent 12.17%. The variance in importance of this nature between the two different ranks of contractors might be again due to management, where it makes the difference in the previous combination of nature (contract and management).

Combined Nature of disputes including financial, construction and contract is classified in fourth rank according to the responses from the first-Degree contractors with a percentage of 11.11%. This combination of dispute nature is ranked the last according to the responses with a percentage of 3.4%. Construction and financial nature of dispute is at the second-Degree contractors' firms, higher than the first-Degree contractors. The combination of financial, construction and contract in the huge-sized project handled by the first-Degree contractors is vital and the frequency of occurrence happened more in projects handled by them. Construction disputes have a contract document references to solve it, and it costs the contractor time and money to do so, but if all this combination is lost in a project then it can lead to severe disputes.

As explained above, the financial impact of the construction dispute is directly related to the total project value and the disputed scope. From this point, the first-Degree contractors classify the financial and construction nature of dispute to this level with a percentage of 8.33%. Second Degree contractors under estimated the importance of this combination, though they face limited fund ability, but it seems that they are counting on out-sourcing, from an approved list.

Contract and construction nature of dispute combined took the sixth place according to the first-Degree contractors with a percentage of 5.56%. Second Degree contractors raises the importance of this combination to the fourth degree with a 10.42% percentage because the construction disputes that is not related to financial issues is

easier to resolve by first Degree contractors, but on the other hand the second Degree contractors might have a faulty negotiation procedure.

Remaining combination of dispute natures is almost equal between the contractors of first and second Degree; these combinations occur only in severe odd situation of projects like the combination of all the nature of disputes.

It is noticeable that the accumulative percentage of financial nature of dispute which is around 70% indicates the importance of money and fund in construction, especially the delay of payment from the client, and the excessive omission and addition in contract scope and quantity. Moreover, it is noticed that the accumulative contractual nature of dispute which reaches to 73% for changing the project specification after the material approval, ambiguities in the contract documents, inaccurate specification of items, and the first-Degree contractors are dealing with large project that contract must organize all of its operational activities of the construction and coordinate between them in a contractual basis.

TABLE 42. The combined root cause of dispute from the 1st Degree contractors

Reason of dispute	Number of respondents	Percent (%)
Disputes related to financial + Dispute related to contract	12	33.3
Dispute related to contract + Dispute related to management	7	19.44
Dispute related to construction + Dispute related to contract	2	5.56
Disputes related to financial + Dispute related to management	5	13.89
Disputes related to financial + Dispute related to construction	3	8.33
Disputes related to financial + Dispute related to construction + Dispute related to contract + Dispute related to management	1	2.78
Disputes related to financial + Dispute related to construction + Dispute related to contract	4	11.11
Dispute related to construction + Dispute related to management	1	2.78
Dispute related to construction + Dispute related to contract + Dispute related to management	1	2.78

Total	36	100

TABLE 43. Root cause of dispute according to second-Degree contractors

Reason of dispute	Number of respondents	Percent (%)
Disputes related to financial + Dispute related to contract	21	36.73
Dispute related to contract + Dispute related to management	14	25.45
Dispute related to construction + Dispute related to contract	6	10.42
Disputes related to financial + Dispute related to management	7	12.17
Disputes related to financial + Dispute related to construction	3	5.15
Disputes related to financial + Dispute related to construction + Dispute related to contract + Dispute related to management	2	3.40
Disputes related to financial + Dispute related to construction + Dispute related to contract	2	3.40
Dispute related to construction+ Dispute related to management	1	1.64
Dispute related to construction + Dispute related to contract + Dispute related to management	1	1.64
Total	57	100

4.3.2 Source of dispute from the owners' point of view

We study the nature cause of dispute from the owners' point of view (the two types of owners; the private and the governmental) in this section, by comparing between their answers, and comparing between the answers of the contractors.

This section will be divided into two parts, the first will discuss the nature of dispute from the point of private owners' view, and the second part will discuss the same from the governmental point of view.

4.3.2.1 Source of dispute from the private owners' point of view

Private owners face contstruction disputes, because they fund the projects, and they have the highest expectations, with the least cost within the shortest time.

A percentage of 45% (majority of dispute nature) is due to financial reasons, which is logical in case of the project owner for a lot of reasons, during the preparation of the project estimation for budget and design, preparing accurate BOQ and the faced discrepancy between the contract documents. At the end, the owner is the one who is funding the project, and the payment amount and methods of payment makes a lot of difference in calculation.

Management nature of disputes are classified as second importance with a percentage of 15%. In Saudi Arabia, it seems that the private owners are tending to deploy management companies, client representative, or a separate consultation firm to supervise the execution of the construction, which creates an enviroment for the multiple approval authorites and contradiciton among them. [32]

Out of the respondents, a percentage of 5% stated that the nature of dispute is due to construction reasons. Private owners might have a construction based disputes because of the civil defense requirements, project deliverables that are less than expected and delay of handing the project according to the agreed milestones.

Private owners seems that they did not generate their own contractors data base, indicating the real capabilities and performance over the executed project which qulaify them to the next project. Data base is a major factor in selecting the contractor to be awarded the project. In the absence of this data base, projects can be easily awarded to un-qualified contractor that will create lots of un-reseaonable disputes.

It is noticable that the private owners did not face any contract based dispute, which could be due to the earliest intervention from their side to resolve the disputes. The professional deployed client representatives are keen to direct the construction contract till the end of the project, but on the other hand, they do not have any responsibility for the consequences of their management.

The last 35% percentage from the respondents stated that the nature of disputes are combined reasons.This combination varies between the four main reasons of dispute nature.

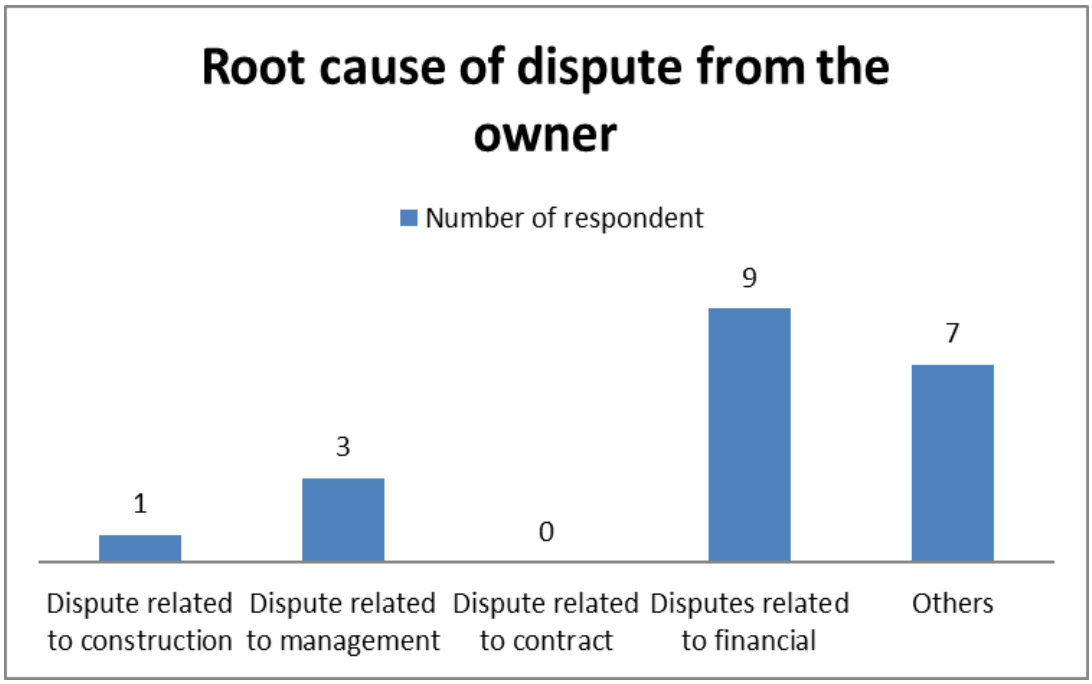


FIGURE 30. Root cause of dispute from the point view of private owners

Analytical observation to the combined root cause of dispute shows that 28.5% percentage of root causing dispute is due to financial and contractual at the top, indicating the syndrome of finance adherence to contract in construction, the failure to manage any of them will lead to failure in a direct or indirect way.

Financial print on construction industry might be referred to the limited option of project funding and fluctuation in prices of goods and services in Riyadh, Saudi Arabia, that forces the private owners to take one of two options: find another available source of project funding, or to re-design, and change the original project specification and scope to meet the available fund and budget; otherwise the private owner will fall into a dispute with contractor due to local options (like extension of the project execution period or changing the payment terms) [32].

A percentage of 14.3% responded that the dispute is due to management and contract. Management responsibility is to put all the resources efficiently together to produce the deliverables and achieve the target of the project. Contract outlines the rules and the regulation to manage relationships between the contractor and the client, in-case this contract is not well balanced in duties, risk and obligations between the owner and the contractor are not considered, then a dispute will surely result. [32]

Another percentage of 14.3% response of combined nature of dispute is the construction and contract. The inspection plan is a part of the contract documents. Moreover, the acceptance criteria to regulate the re-work procedure and who will pay for the re-work cost. This process is managed as a part of the whole project management.

Delay in connecting and delivering the tie-in points to the project is part of the construction dispute that results between the contractor and the owner.

Management and financial issues can cause fatal dispute; respondents replied that this combination of dispute is important with a percentage of 14.3%. The accumulative percentage of financial dispute nature reaches to 57%, indicating that the importance of financial factor construction. From all of what has been mentioned regarding the finance, in addition to the management role, it is understandable why the management and financial nature of dispute are signified to this rank.

With the same importance, and percentage of responses to the previous combination, is the combination of finance and construction as a reason of dispute. Low quality work, or not conformance with the project specification costs the project time and money to be paid. That cost is not considered mostly in project as a separate item in project budget, therefore that combination could cause a dispute in projects.

Finally, the last 14.3% demonstrated that the dispute is due to construction and management. During the bidding stage of the project, contractor prepares the schedule for project, and failure to comply with the schedule, and managing to recover the delay is the main combined source of dispute

What is interesting in our results is the equal percentage of respondents to the nature reasons of dispute, indicating equal importance of all the factors (construction, finance, contract and management) to private owners and the disputes mostly never come from a single reason to the private owners.

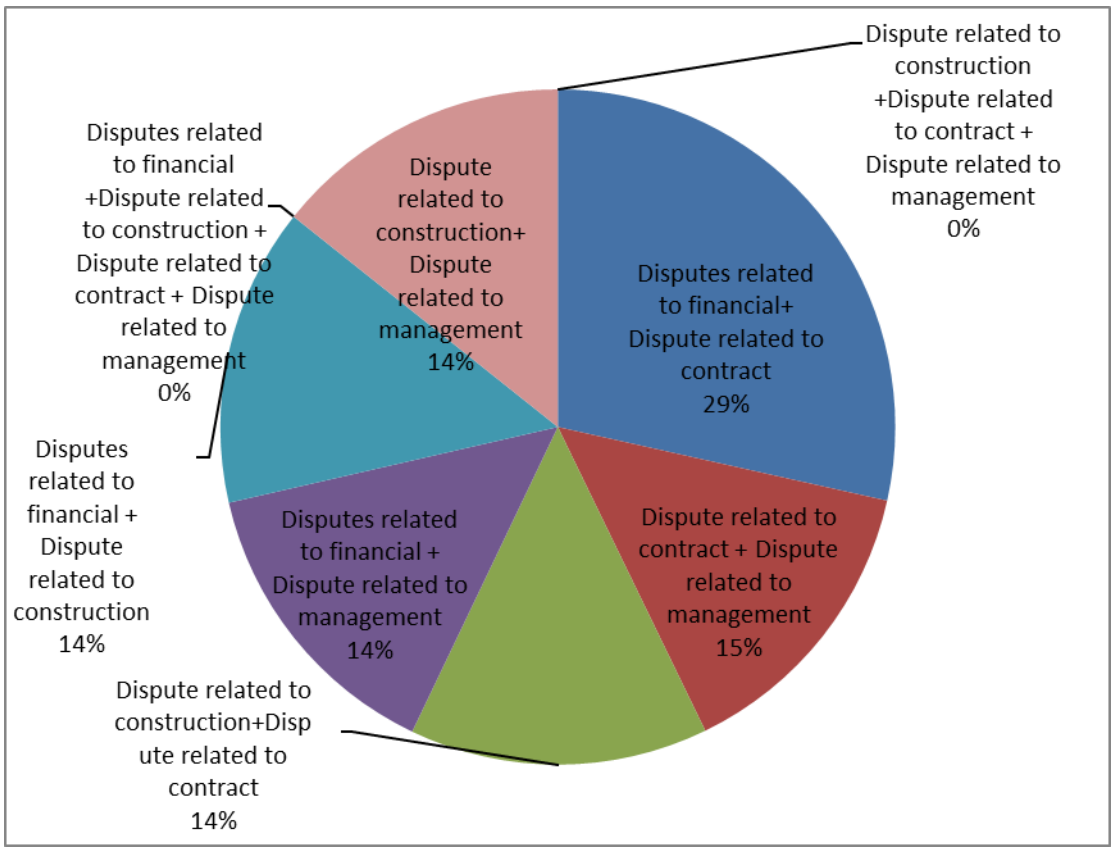


FIGURE 31. Combined root cause of dispute from point of private owners

Table 44. Comparison between the contractors and private owners combined nature of dispute

Reason of dispute	Respondents - contractors	Percent (%)	Respondents	Percent - P. owner (%)
Disputes related to financial + Dispute related to contract	27	29.1	2	28.5
Dispute related to contract + Dispute related to management	16	17.3	1	14.3
Dispute related to construction + Dispute related to contract	15	16.2	1	14.3
Disputes related to financial + Dispute related to management	11	11.9	1	14.3
Disputes related to financial + Dispute related to construction	9	9.6	1	14.3
Disputes related to financial + Dispute related to construction + Dispute related to contract + Dispute related to management	5	5.3	0	0
Disputes related to financial + Dispute related to construction + Dispute related to contract	4	4.3	0	0
Dispute related to construction + Dispute related to management	5	5.3	1	14.3
Dispute related to construction + Dispute related to contract + Dispute related to management	1	1	0	0
Total	7	100	7	100

By comparing the combined nature of dispute between the private owner and contractors, the above table summarizes the results.

Contractors and private owners agreed with the same percentage that the main nature reason of dispute is the combination of financial issues and contract, indicating the awareness of contract and financial importance to both of them.

Contractors signifies the combination of *"contract and management"*, "construction and contract", "construction, management, contract and financial" and "financial, contract and construction" over the private owners, that might be referred to deep involvement of contractors in construction at site rather than just managing it like the private owners.

Moreover, the contractors fund the project from his own budget till the next payment is certified and paid, and any delay in payment cause accumulation of constant expenditures, unlike the private owners who does not have a significant constant cost. A glance at below single nature of dispute reflects the difference between the respondents' percentage from contractor (45%), and the private owners (9.23%).

In contracts, the owner tends to draft a contract that is in his favor of himself, even if it is not fair or legal, but the contractor suffers at the execution stage of the project, and tries to compensate the flaws in contract by the raised claims. A glance at below single nature of dispute reflects the difference between the respondents' percentage from contractor (11.54%), and the private owners (0%).

Management on the other hand is more tedious work and consumes lots of effort from the private owner side, because as mentioned, it requires him to coordinate between the contractors, get the required permissions, follow-up the project milestone and plan and conduct a periodic project reviewing. That is the main reason why the private owners could have more contractual based disputes than the contractors.

Finally, the contractors and the private owner share the same percentage of responses regarding the construction-based disputes. Contractor is concerned about executing the tasks and the project with the lowest cost and highest specified quality, to avoid the delay and the work repetition. Private owners are concerned about having the project completed and start earning the return of the investment the earliest. From these explanations, the private owner and the contractor responded to construction dispute almost with the same weight.

TABLE 45. comparison between the private owner and contractors in single nature of dispute

Usual disputes sources	Respondents - contractor	Percent (%)	Respondents - P. owner	Percent (%)
Combined	93	71.54	7	35
Disputes related to financial	12	9.23	9	45
Dispute related to contract	15	11.54	0	0
Dispute related to management	4	3.07	3	15
Dispute related to construction	6	4.62	1	5
Total	130	100	20	100

4.3.2.2 Source of dispute from the governmental point of view

From the responses of the governmental participants in the study, it is confirmed that the nature of dispute cause in construction industry usually occurs not because of a single reason, but due to combined nature of disputes such as the development of construction material, high level of interaction between the stakeholders, and the new construction methods and management basic involvements.

Governmental responses show that 17.65% from the respondents stated that the root cause is due to financial issues, which is a result from low oil prices during the last few years, and the limitation of the budget to each governmental ministry, thus they face disputes with the contractors because of payments schedule.

Following in importance the financial source of dispute is the management cause with a percentage of 11.76%. Though the governmental ministries are well-organized and have their own monitoring and reviewing board, but the long process of correspondences, and issuance of a documented official orders (like change order, payment order, etc.) are taking too much time for the administration processes, in

addition to low number of experience years among all the respondents (average 5 to 10 years of experience) could be the reason for the management disputes.

Contractual reasons as a single reason for the dispute responses represent 8.82% from the total responses. Contract administration is the key to project success, which is emphasized by the global report of ARCADIS, but the governmental did not prioritize this reason due to the monitoring and reviewing board of projects, who mostly conduct the contract management, so it is considered to them in minimal ranking. On the other hand, the chosen signed contract between the governmental ministry and the contractor, and its flexibility for changes in the construction project plays a major role in contract administration and disputes.

The remaining percentage of 5.88% responded that it is due to construction reasons. Contractor delays in following the project schedule and project milestone, in addition to the quality of the workmanship faced due to shortage of the skilled technician in the labor market, causes construction defects and work repetition, could be the reasons for the construction dispute.

Finally, 55.89% of responses from governmental shows that the root causes of dispute are a combined cause.

Comparing responses from the contractors and the private owners, financial issues and contract nature of dispute were the most important factors from the governmental ministries' point of view, with almost the same percentage of responses (26.3%). This might indicate that most of the construction disputes in the study area are the financial and the contract related ones as responded by all the experts in the field spectrum.

Contract and management reason of dispute is in second rank, with a percentage of 15.7%. That combination of reason again complies with the order of importance from the contractor and the private owners.

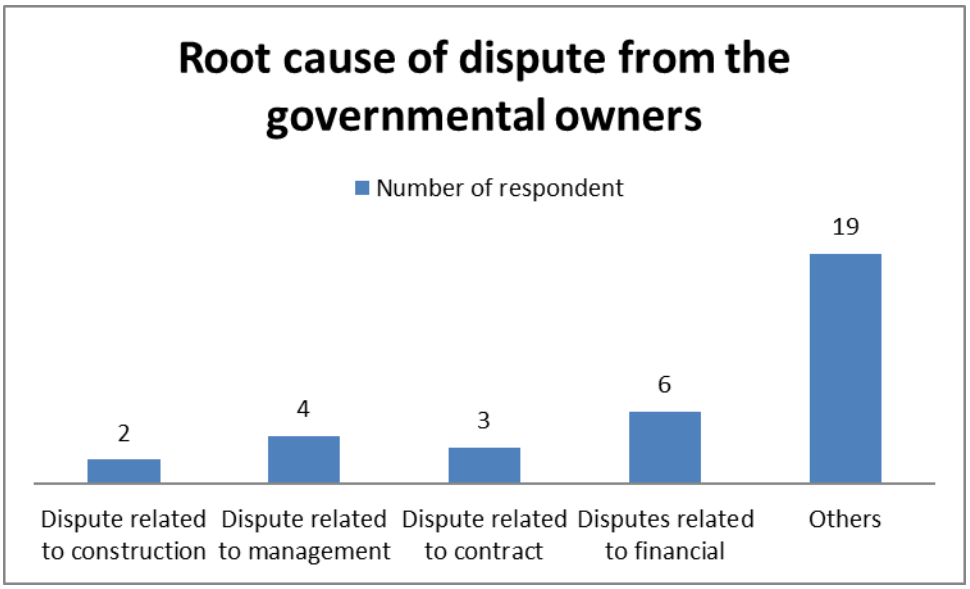


Figure 32. Root cause of dispute from the point view of Governmental

TABLE 46. The combined nature of dispute from the governmental point of view

Reason of dispute	Respondents	Percent (%)
Disputes related to financial+ Dispute related to contract	5	26.4
Dispute related to contract + Dispute related to management	3	15.7
Dispute related to construction + Dispute related to contract	3	15.7
Disputes related to financial + Dispute related to management	2	10.5
Disputes related to financial + Dispute related to construction	2	10.5
Disputes related to financial +Dispute related to construction + Dispute related to contract + Dispute related to management	1	5.3
Disputes related to financial + Dispute related to construction + Dispute related to contract	1	5.3
Dispute related to construction+ Dispute related to management	1	5.3
Dispute related to construction + Dispute related to contract + Dispute related to management	1	5.3
Total	19	100

Governmental ministries responded that the disputes related to construction and contract is the next important nature/reason of dispute, with a percentage of 15.7% (the same percentage of management and contract). Moreover, that is the same importance level of contractors and private owners, which confirms the concurrence between the construction stakeholders on reasons of dispute.

Disputes with financial and management combined together have shown importance according to 10.5% from the total surveyed. This combination of dispute reasons is ranked the lowest, which might be due to the reviewing and monitoring board from the managerial aspect. Moreover, the ministry of finance has set the payment submission method online, but it is considered as a reason of dispute because of the long processing time of any managerial or payment application. This combination of dispute reasons is in-line with the responses from the contractors and the private owners with different percentages.

Another component of dispute reason has the same significance and percentages from the governmental respondents, construction and financial issues with a percentage of 10.5%. This combination has the same effect on construction dispute because both of "financial issues and management" and "construction and management" have the miss-management common between them that leads to lots of disputes. Private owners and contractors agree on the priority of this combination of dispute reasons, because of the required quality of project deliverable and time and cost associated with any deviation from this quality.

Governmental respondents replied that the combination of all the reasons (management, contract, finance and construction) is faced in their experienced project

with a low percentage of 5.3%. In rare projects that were not studied well, disputes escalated to an extensive way and included all the corners of construction faced by the governmental respondents could be the case of this fatal combination of dispute reason. This result is in concurrence with contractors but not with the private owners, which might be because all the projects that have this case are awarded from the governmental ministries.

Moreover, the same combination without the management responded with the same percentage (5.3%). This combination gives an indication that the finance is an important factor in dispute because it is shared as a combined reason with the previous factors. The same order and percentage are shared with the contractors, but not the private owners, which could be for the professional level of finance management.

Construction and management dispute reason and nature are ranked by the governmental respondents as the one before the last ranking, with a percentage of responses of 5.3%. This low percentage of dispute reasons seems to be as low as the reviewing and monitoring board is doing a good performance in following-up the projects, and the management is following the governmental regulations in construction carefully.

Contractors are sharing the same importance and percentage for this combination, unlike the private owners who exaggerate this combination of reason to 14.3% (equal to other stated combined nature of disputes). Private owners are facing difficulties in general with all the contractors that might be because of their high expectations.

Dispute related to construction, contract and management are stated to be the least important from the point view of governmental ministries, with a percentage of 5.3%, equal to other combinations of disputes. Mainly because of the financial reasons, this

combination from the governmental side is a side effect. In contrary to the private owners who did not find this combination of reasons valid, because management deployed team assigned to supervise the project. Contractors with an extensive experience and organizational skills faced construction and management disputes, but with low percentage of 1%, because they are familiar with the construction market and select the best construction method that suits the project.

TABLE 47. Comparison between the combined nature of dispute between the contractors, private owners and the governmental ministries.

Reason of dispute	Percent – contractor (%)	Percent - P. owners (%)	Percent – Governmental (%)
Disputes related to financial+ Dispute related to contract	29.1	28.5	26.4
Dispute related to contract + Dispute related to management	17.3	14.3	15.7
Dispute related to construction + Dispute related to contract	16.2	14.3	15.7
Disputes related to financial + Dispute related to management	11.9	14.3	10.5
Disputes related to financial + Dispute related to construction	9.6	14.3	10.5
Disputes related to financial +Dispute related to construction + Dispute related to contract + Dispute related to management	5.3	0	5.3
Disputes related to financial + Dispute related to construction + Dispute related to contract	4.3	0	5.3
Dispute related to construction+ Dispute related to management	5.3	14.3	5.3
Dispute related to construction +Dispute related to contract + Dispute related to management	1	0	5.3
Total	100	100	100

From all the responses, it is observed that the contract is the reference for lot of disputes and that accumulatively can reach to 73.6% from all the respondents, indicating that the contract is one of the most disputed factors in construction.

Financial issues factor can be considered one of the control factors for selecting the type of contract, and the management style of project (book keeping methods,

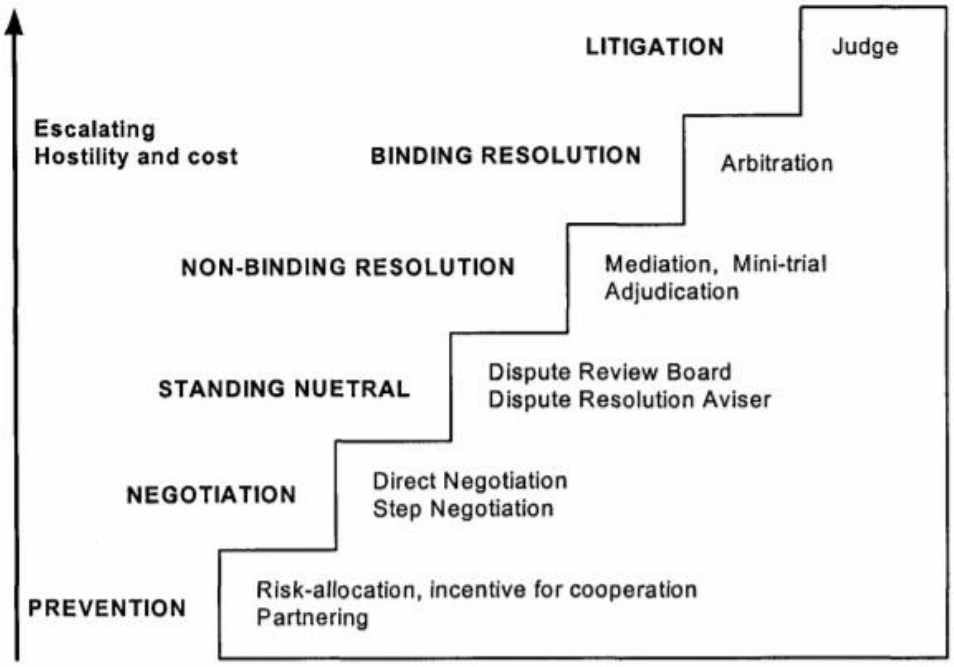
payment submission, etc.), and that is observed from all the study community responses with a percentage reaches up to 60%.

Dispute in construction is tedious and is non-avoidable issue in construction, and its reasons are having different backgrounds and natures, which cannot be isolated easily as reflected from the expert participant of this study. Moreover, the methods followed by them will be discussed in the following sub-chapter, indicating the effectiveness of those methods.

4.4 Solution to dispute usually practiced

This section of the study discusses the experts' reaction in the field toward the dispute. What is the difference in reaction toward the dispute between the study community members, effectiveness of these reactions and finally the most common reaction toward each dispute category.

Usual reaction can be classified into steps as shown in the following graph.



[**Figure 33.** Levels and steps of dispute resolution [38

4.4.1 Contractors usual reaction toward dispute

Since the nature and the reason of dispute between the contractor and the client is a combined reason, we could state that also the reaction taken by the contractors towards the disputes is also a combined reaction.

A percentage of 68% of contractors take a combination of reaction or responses to resolve the dispute, because the developed experiences show that the dispute cannot be resolved in a simple one step, and there is no right or wrong approach. Resolving the dispute usually goes into multiple trials to solve the dispute, and most of the times with a combined action.

One fourth of the contractor respondents mitigated the dispute because it is simple, quick, and in order not to reveal the company's confidentialities to a third party. Even the mitigation process of the dispute in construction goes into multiple rounds to close the gap between the expectations of each party and what is offered.

Contractor varies in reaction toward the dispute, depending on dispute nature, project size and the effect of dispute financially. From this perspective 2% hold the disputed work area only and completed the rest of the project. This approach of resolving the dispute maintains the good relationship with the owner and does not affect the total project.

In worst scenarios of disputes, there is a major change in the scope of the project, or incomplete design package, the contractor is forced to hold the whole project. Only 2% from the total contractor respondent stated that this is the reaction to dispute they took.

In construction industry, contractors are willing to compromise till a certain limit, in order to maintain the reputation of the contractor and keep the project moving forward. This compromising approach is sacrificing the benefits for the sake of completing the project, which is responded by 1% only. This action has a disadvantage because it occurs when exceeding the budgeted cost of the project, and accordingly, losing a new project opportunities.

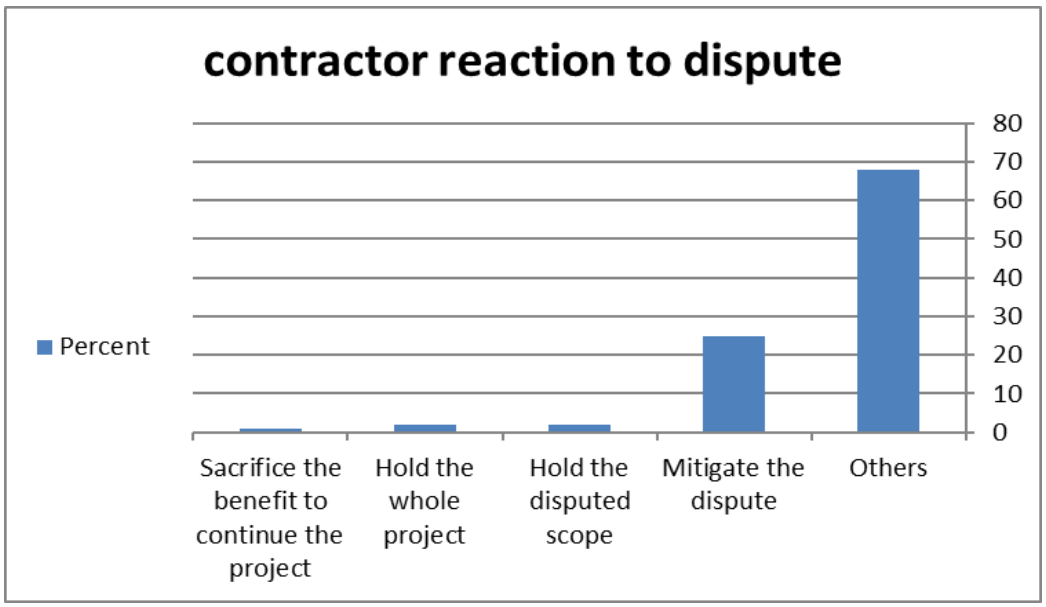


FIGURE 34. Contractor reaction toward dispute

Analytical study for the combined reaction adopted towards the dispute by the contractors, depends on the size of dispute, source of dispute, impact of the dispute on the whole project, accordingly, the experts in construction decides what to react.

The following table shows the reaction we have asked in this study regarding the dispute, but contractors might take other reactions that are not listed.

A study investigating the usual reactions shows that most of the respondents mitigate the dispute and hold only the disputed work area only, with a percentage of 38%.

Mitigation is the simplest and easiest solution to disputes, which maintains the good relationships with the owner and does not reveal the commercial secrets of the two disputed parties. Holding the disputed work area does not only affect severely the total project progress and will not hurt the losing side of dispute.

Table 48. Contractor usual reaction toward the dispute

Reaction toward the dispute	Percent (%)
Hold the disputed scope + Mitigate the dispute	38
Mitigate the dispute + Sacrifice the benefit to continue the project	11
Hold the disputed scope + mitigate the dispute + Sacrifice the benefit to continue the project	5
Hold the whole project + Mitigate the dispute	4
Hold the disputed scope + Hold the whole project + mitigate the dispute + Sacrifice the benefit to continue the project	3
Hold the disputed scope + Sacrifice the benefit to continue the project	2
Hold the disputed scope + Hold the whole project	1
Hold the disputed scope + Hold the whole project + mitigate the dispute	0
Hold the disputed scope + Mitigate the dispute + De-scope	0
Hold the disputed scope + Refer to legal department	1

The second top reaction by the contractors is *mitigating the dispute* and *sacrificing the benefits in order to continue the project*. This combined reaction is responded by 11% from contractors. This reaction keeps the dispute internal and initiates the compromising process to proceed with good intention.

Other combination of reactions combines *mitigating the dispute*, *holding the disputed work* area with *sacrificing the benefit to continue the project*; this combination is responded by 5%. An advantage of this combined reaction to dispute is: in addition to

the previous advantages of the previous combined reaction, it shows the good intention and ethics to resolve the dispute and to count for a favor at a later stage. This could be somehow the best combined dispute resolution.

Minority of contractors suspends the whole project and mitigates the dispute with a percentage of 4%. This reaction shows a side of extreme measures to resolve the dispute, by suspending the whole project. Suspending the whole project can be a proper reaction in deep, extreme disputes, like the scope and design basis of the project.

Suspending the disputed scope, then suspending the whole project, besides mitigating the dispute with good intentions to resolve the dispute by sacrificing the benefits and profits in order to continue the project is what 3% from respondents replied. This combined reaction is still trying to resolve the dispute swiftly in house or internally, with a pressure on the owner to accept and react for dispute with the best for the contractor.

Only 2% from the respondents replied that they would hold the disputed scope and sacrifice the benefit to continue the project. This combination of reaction does not resolves the dispute. Disputes cannot be solved by only sacrificing the benefit, and "time heals the wounds" does not apply here, because the construction disputes are not friendly.

Holding or suspending the disputed scope and holding the whole project is the extreme negative reaction, because again there is no any intention to resolve the dispute, or even a trial to maintain the cycle of the project. This combined reaction indicates the lack of trust, and weakness of the contractor.

Holding the disputed scope and referral to legal department is the last combined reaction taken by the contractors to overcome the dispute. Such a reaction does not give a chance for the mitigation or mediation, and faster solution, but it goes directly to legal judgment, which loses the relationship with the owner, and smudges the contractor and the owner reputation.

- First Degree contractors

1st Degree contractors are tending to resolve their dispute as early as possible to keep their cost and project milestone on track, and to avoid any further un-necessary distraction to site personnel by the litigation

Out of the first-Degree contractor, responses of 64.52% states that they take a combined reaction to resolve the dispute, these combinations will be illustrated next.

Almost 25% mitigated the dispute (preferred single reaction by the first-Degree contractors) for its cheap, maintaining the relations, fast, effective, keep the business secrets, shows the good intention, and resolve the dispute in-house.

Holding the disputed work area responded with a percentage of 3.23% from the total contractors from the first Degree. This low percent of this action is referred to holding the disputed work might turn over the contractor at the end of project as delay penalties, and loss of opportunity.

A percentage of 3.23% from respondents would hold the whole project. There is a big difference between the two actions, where in the first action "holding only the disputed work" the contractor is isolating the source of disturbance and un-comfort, whereas in the second action contractor "holds the whole project" as a severe demonstration of

un-acceptance. Both isolated reactions are not resolving the dispute that is why the percentage of first Degree concurrence to this reaction is uncommon

Finally, sacrificing the benefit to continue the project, contractor tolerate his benefits on short term to achieve a long-term gain with the owner, or make a favor to the owner which he might ask in return one favor. This is somehow not a professional way, that's why only 1% of respondents replied with this reaction.

Table 49. The usual reaction of first Degree contractors toward dispute

Common practice	Number of respondents	Percent (%)
Combined	40	64.52
Mitigate the dispute	17	27.42
Hold the disputed scope	2	3.23
Hold the whole project	2	3.23
Sacrifice the benefit to continue the project	1	1.61
Total	62	100

The combined reaction taken by the 1st Degree contractors, listed in table are: around half of them mitigated the dispute and hold only the disputed work area. It seems that this combined reaction is the common reaction by the first-Degree contractors, because it is effective, quick and cheap reaction.

A percentage of 15% of respondents mitigates the dispute and sacrifices the benefit to continue the project in a tolerable approach. This reaction keeps the project moving and maintains the foot prints in business.

More comprehensive moderate reaction to dispute is mitigating the dispute, holding the dispute work area and sacrifice the benefit to continue the project. From all first-

Degree contractors, only 12.5% replied to the questionnaire with this choice, which might be because it gives a chance for the negotiation while the project is not affected.

Only 10% mitigated the dispute but hold the whole project. This situation can be justified only if there is incomplete design package, or the continuation of the project would cause lots of losses and work repetition to the owner.

Other combination of reactions (Hold the disputed scope, then hold the whole project, mitigate the dispute with intention to sacrifice the benefit to continue the project), (Hold the disputed scope, and willing to sacrifice the benefit to continue the project), (Hold the disputed scope, and hold the whole project), and (Hold the disputed scope and refer to legal department) shares the same percentage of 5% for the equality of importance.

The first combination (Hold the disputed scope, then hold the whole project, mitigate the dispute with intention to sacrifice the benefit to continue the project) has severe impact on project progress, where it holds everything, but at the same time have actions to resolve the dispute in-house. This action could be explained that the contractor did not face serious actions from the owner to resolve the dispute for a long period of time, which pushes him to hold the whole project as an act of protesting.

The second combination (Hold the disputed scope, and willing to sacrifice the benefit to continue the project) has an impact in pushing the project forward. This combination has a point against it that it does not initiate any serious actions to resolve the dispute.

(Hold the disputed scope and hold the whole project) is a tendency to negative reaction, because it only stops the project without any approach to resolve the dispute.

Lastly, the fourth combination (Hold the disputed scope and refer to legal department) goes to court to resolve the dispute with all the sequences of savaging the budget and wasting time in legal action, and worth to mention the reveal of commercial secrets of owner and contractors.

Table 50. The combination of reaction to dispute taken by first Degree contractors

Usual combined reaction	No. of respondents	Percent (%)
Hold the disputed scope + Mitigate the dispute	17	42.5
Mitigate the dispute + Sacrifice the benefit to continue the project	6	15
Hold the disputed scope + mitigate the dispute + Sacrifice the benefit to continue the project	5	12.5
Hold the whole project + Mitigate the dispute	4	10
Hold the disputed scope + Hold the whole project + mitigate the dispute +Sacrifice the benefit to continue the project	2	5
Hold the disputed scope + Sacrifice the benefit to continue the project	2	5
Hold the disputed scope + Hold the whole project	2	5
Hold the disputed scope + Hold the whole project + mitigate the dispute	0	0
Hold the disputed scope + Mitigate the dispute +, De-scope	0	0
Hold the disputed scope + Refer to legal department	2	5
Total	40	100

- Second Degree contractors

Second Degree contractors step more to the combination of reactions to disputes with a percentage of 72.06% more than the first-Degree contractors. That could be due to realizing that the second-Degree contractors face problems in management and contract.

The next single reaction in percentage is mitigating the dispute with a percent similar to the first-Degree contractors (23.53% second Degree contractor, while 27.42% first Degree contractor). That reaction can be explained by the effectiveness in using this method to resolve the dispute.

Finally, holding the whole project, holding the disputed work and sacrificing the benefit to continue the project shares the same percentage of 1.47% which is less than the first-Degree contractors. These percentages seem to be due to the limitation of fund of second Degree contractors and rushing to resolve the dispute before the escalation to conflict.

TABLE 51. The usual reaction of second Degree contractors toward dispute

Common practice	Number of respondents	Percent (%)
Combined	49	72.06
Mitigate the dispute	16	23.53
Hold the disputed scope	1	1.47
Hold the whole project	1	1.47
Sacrifice the benefit to continue the project	1	1.47
Total	68	100

Second Degree contractors match the first-Degree contractors in the combined reaction toward the dispute, and here arises the contradiction between their familiarity of techniques to resolve the dispute, and their failure to prevent it in the first place by managing the contract properly, and properly monitoring the quality and the administration processes.

From the comparison table between the first-Degree contractors and the second-Degree contractors, it is shown that the percentage of responses is almost similar. The similarity in responses might be referred to the level of awareness developed in the second-Degree contractors over the years, and the immigration of skilled personnel from the first-Degree contractors firm to the second Degree besides leaving the Saudi construction market.

Table 52. Second Degree contractor usual combined reaction to dispute

Usual combined reaction	No. of respondents	Percent (%)
Hold the disputed scope + Mitigate the dispute	21	42.86
Mitigate the dispute + Sacrifice the benefit to continue the project	7	14.29
Hold the disputed scope + mitigate the dispute + Sacrifice the benefit to continue the project	6	12.24
Hold the whole project + Mitigate the dispute	5	10.20
Hold the disputed scope + Hold the whole project + mitigate the dispute +Sacrifice the benefit to continue the project	3	6.12
Hold the disputed scope + Sacrifice the benefit to continue the project	3	6.12
Hold the disputed scope + Hold the whole project	2	4.08
Hold the disputed scope + Hold the whole project + mitigate the dispute	0	0
Hold the disputed scope + Mitigate the dispute +, De-scope	0	0
Hold the disputed scope + Refer to legal department	2	4.08
Total	49	100

TABLE 53. comparison between the combined reaction toward disputes in 1st Degree contractors and 2nd Degree contractors

Usual combined reaction	No. of respondents – 1st Degree	Percent – 1st Degree (%)	No. of respondents – 1st Degree	Percent – 1st Degree (%)
Hold the disputed scope + Mitigate the dispute	21	42.86	17	42.5
Mitigate the dispute + Sacrifice the benefit to continue the project	7	14.29	6	15
Hold the disputed scope + mitigate the dispute + Sacrifice the benefit to continue the project	6	12.24	5	12.5
Hold the whole project + Mitigate the dispute	5	10.2	4	10
Hold the disputed scope + Hold the whole project + mitigate the dispute +Sacrifice the benefit to continue the project	3	6.12	2	5
Hold the disputed scope + Sacrifice the benefit to continue the project	3	6.12	2	5
Hold the disputed scope + Hold the whole project	2	4.08	2	5
Hold the disputed scope + Hold the whole project + mitigate the dispute	0	0	0	0
Hold the disputed scope + Mitigate the dispute +, De-scope	0	0	0	0
Hold the disputed scope + Refer to legal department	2	4.08	2	5
Total	49	100	40	100

Contractors usually take a combined reaction toward the dispute. The most common combination reaction is mitigating the dispute and holding the dispute work area. This combination of action allows the dispute to be resolved in-house, quickly and almost costless. In the meantime, holding the disputed work area minimizes the collateral damage in the project, and does not obstruct the dispute-free activities.

Most of the contractors choose to mitigate the dispute as a single reaction toward the dispute, for its effectiveness in resolving them, and shorten the time for resolving the dispute

Those two reactions are extracted from the questionnaire, and interviewed conducted with the expert of construction, which is tested according to the best of the knowledge of the respondents, supported by their long-term experience in the field and high-level of education and training they have been through.

4.4.2 Owners' usual reaction toward dispute

In this section we study the usual reaction of private owners towards the disputes and compare it and compare its effectiveness with the contractors.

This sub-chapter will discuss the two different types of owners; the private owner and the governmental ministries and try to identify the difference between their reactions.

4.4.2.1 Private owners' usual reaction toward disputes

Private owner perspective is more totalitarian rather than detailer, which is recommended in case of assigning a fully authorized, technically representative of the owner to tackle these disputes. Otherwise, the private owners would be part of the main reasons of disputes and construction struggle in Riyadh, bearing in mind that they own 76.6% of the whole construction projects.

Private owners did not react toward the dispute as the contractors, in general. First difference in their reaction was the percentage of the combined actions toward the dispute; it is shown that only 5% from the private owner respondents took combined

actions to resolve the dispute. Contractors' respondents have taken a combined reaction to resolve the dispute in more than one way (the percentage is 68%).

TABLE 54. Private owners' usual reaction toward dispute

Common practice	No. of respondents	Percent
Others	1	5
Mitigate the dispute	3	15
Hold the disputed scope	11	55
Hold the whole project	2	10
Sacrifice the benefit to continue the project	3	15
Total	20	100

Private owner's action is strict, sharp, and definite against the dispute, unlike the contractors whose actions put more pressure on the owner to settle the dispute, with more flexibility to seize the opportunity of any claim (time and money wise).

A percentage of 15% from the private owners' respondents mitigated the dispute. The percent of dispute mitigation from the contractors' side is 25%, which indicates that the contractors are more flexible in contract management than the private owners.

In other hand, the private owners tend to push the dispute forward, or take a stricter reaction by de-scoping the disputed scope of work, that is shown from the percentage of respondents who hold or suspend the disputed work (percentage of 55%). Contractors hold the disputed work area as a part of other actions to resolve the dispute, as a single action toward the dispute only 2% of them had this option for solution. Contractors seem to like the high turnover of projects to utilize the skilled

workers by completing the projects in-hand as fast as possible, that’s why they might tend to hold only the disputed work only, not the whole project.

Holding the whole project is the option to resolve the dispute, from the private owners' side to 10% from all respondents. Contractors tend to hold either the whole project or any part of it for the same reasons of turning over project with a high rate. Private owners' hold the whole project or the disputed scope to show that they are not willing to comply with contractors actions.

Private owners tend to sacrifice the benefits to compete the projects more than the contractors, this is shown from the percentage of respondents to this option of resolving the dispute (15% from private owner compared to 1% from contractors). Sacrificing the benefits to complete the project shows good intention, but it has a budget over run, contractors are not willing to absorb it, in the contradictory the private owners is willing to do so for the sake of receiving the return on investment at once, which can justify this percentage.

Private owners are not willing to fund a project that goes into major re-design due to unforeseen situations or a jurisdiction order to halt the whole project. Consequences to this halt affect directly the built-up momentum of construction, which will take more time to re-build again after the decision to continue the project.

Combined reaction taken by the private owners to resolve the dispute is responded by only 1% private owners. The combination was to mitigate the dispute and hold the disputed work area. This reaction is in-line with most of the contractors combined reaction toward dispute. The combined reaction might indicate more mature and professionalism in dealing with day to day disputes to prevent the escalation of them to more difficult-conflict which is harder to be solved.

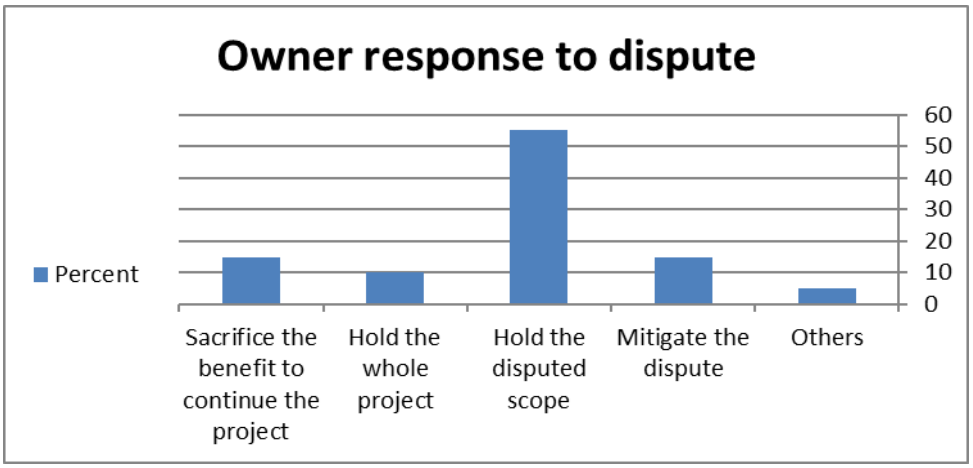


FIGURE 35. Usual reaction of private owners toward dispute

The combined reaction taken by the private owners to resolve the dispute is hold the disputed work area and mitigate the dispute. This reaction was taken by only respondents from the private owners

- **Comparison between the private owner reaction toward dispute with 1st Degree contractors:**

Around 65% from the first-Degree contractors react with a combined action to resolve the dispute, but only 1 private owner of them react with a combined reaction toward the dispute. This combined reaction matches the most common reaction of the first-Degree contractors (mitigating the dispute and hold the disputed work). Contractors from the first Degree are ranked according to their high capability and assets, which is reflected on their ability to resolve the rising disputes with the best tailored combined reaction, unlike the private owners who might tend to take a strict action that would push the project and disputes forward.

Contractors from first Degree tend to mitigate the disputes more than the private owners, to maintain the good relationship. The mitigation percentage is 27.42% out of respondents from the first Degree contractors, while it is only 15% out of respondents

from the private owners. First Degree contractors go in-line with the general attitude of contractor action of flexibility in resolving the disputes.

Private owners hold the disputed work area more frequently than the first-Degree contractors, with a percentage of 55% opposed with 3.23% from the first-Degree contractors. Holding the disputed work area is a two-edge sword, from one side when losing the dispute then delay penalties will be faced, but this does not affect the whole project with the halt and limited to a defined area with defined starting hold date.

Holding the whole project is also a reaction taken by the private owner more often than the first-Degree contractors, with a percentage of 10% from the total private owner respondents, and only 3.23% from the total first-Degree contractors' respondents. First Degree contractors do not like to hold the project unless they are forced to do so by the owner, this might be due to the penalties imposed on them because of the resulting delay, and the idle working hours of the technicians who are under his responsibilities.

Sacrificing the benefit and profit in order to complete the project is a conscience option reaction to 15% from the total respondents from the private owners, in order to push the project forward and to start receiving the return of the investment. First Degree contractors do not go to this option in resolving the dispute, and this might be because of the cost overrun to resolve the dispute by this option.

Table 55. Comparison between the first-Degree contractor and private owner to resolve the dispute

Common practice	No. of respondents - 1st Degree contractor	Percent - 1st Degree contractor (%)	No of respondents - P. owner	Percent - P. owner (%)
Combined	40	64.51	1	5
Mitigate the dispute	17	27.42	3	15
Hold the disputed scope	2	3.23	11	55
Hold the whole project	2	3.23	2	10
Sacrifice the benefit to continue the project	1	1.61	3	15
Total	62	100	20	100

From this comparison, it is shown that the first-Degree contractors' reaction matches with the general attitude of the contractors to resolve the disputes. First Degree contractors take a combined action to resolve the dispute more likely followed by mitigating the dispute as a single action towards it. A private owner tends to take single actions to resolve the dispute, most commonly holding the disputed work area.

- Comparison between the private owner reaction toward dispute with second-Degree contractors:

Similar to the first-Degree contractors, second-Degree contractors usually take a combined action to resolve the dispute more than the private owner does, with a percentage of 72% from the total respondents, but only one private owner took a combined reaction to resolve the dispute. The differences in percentage of reactions might be because the owner of the disputed project is outside the study community, or with another type of owner.

Second-Degree contractors are shown to be mitigating the dispute more than the private owners, as reflected by the percentage of respondents is 23.53%. Private owner is not going well with this option to resolve the dispute; this is shown by the

percentage of respondents that reaches to 15%. Second-Degree contractors might be in rush to mitigate the dispute because of their tight budget.

Holding the disputed work and the whole project is almost not an option widely used by the second-Degree contractors to resolve the dispute from their perspective, unlike the private owners who tend to take this reaction to resolve the disputes. Holding the disputed work area is chosen by 55% by the private owners, and holding the whole project is chosen by 10% by the private owners.

In addition to the previous two reactions, is sacrificing the benefits and profits in order to complete the project, which is also not an option widely used by the second-Degree contractors (1.47%) to resolve the dispute, while the private owners used this option out of 15% from the respondents. This reaction represents good intention rather than being a solution for the dispute that is why it might be commonly used in contractor firms alone.

TABLE. 55 Comparison between the 2nd Degree contractors' reaction to resolve dispute and private owner

Common practice	No. of respondents - 2nd Degree	Percent - 2nd Degree contractor (%)	No. of respondents - P. owner	Percent - P. owner (%)

	contractors			
Combined	49	72.06	1	5
Mitigate the dispute	16	23.53	3	15
Hold the disputed scope	1	1.47	11	55
Hold the whole project	1	1.47	2	10
Sacrifice the benefit to continue the project	1	1.47	3	15
Total	68	100	20	100

From the comparison between the first and second-Degree contractors with the private owners in terms of their reactions towards disputes; it is shown that all contractors share the same combined reaction toward resolving the disputes, unlike the private owners who did not believe in this combined reaction as an option to resolve the dispute.

Majority of the private owners choose holding or suspending the disputed work area or the whole project to resolve the dispute and trying to push the project forward and to start receiving the return of the investment. Contractors from all categories choose to mitigate the dispute for its effectiveness.

From the study of the private owner reaction towards the dispute, it is indicated that they are not following the most effective combined actions to resolve the disputes in earlier stage; instead they tend to take firm actions by holding the disputed work area and pushing the project forward to gain the return of the investment as soon as possible.

This reaction is not effective as communicating the reactions towards the dispute as soon as it appears and trying to mitigate it through different approaches with the contractor.

4.4.2.2 Governmental usual reaction toward dispute

Governmental ministries are the last expert participating in this study. Their reaction towards resolving the dispute completes the cycle of all the stakeholders of the construction industry.

Governmental ministries are the governmental sector that contracts the first and second-Degree contractors to build the infra-structure, governmental buildings and the public services buildings along with other construction. All of above mentioned, forces them to generate data-base and generate regulation to review and monitor the construction operations, and administer the contract.

To organize the contractors' work and participation with the governmental works, a royal monarchy order number 510 was issued back three years ago to establish the Saudi contractor's authority, in order to assist in resolving the disputes with any governmental ministry.

Saudi contractor's authority has four sub-committees: ministry of rural and urban affairs, Saudi council for engineers, ministry of labor and ministry of finance, that cover and resolve the dispute whatever is the dispute nature. [32]

Studying the usual reaction of the governmental participant in this study toward the dispute reveals that 11% took a combined reaction toward the dispute, which might be reached by the experts who moved from the field to the governmental organizations because of their previous experience (governmental respondents average experience is 5 to 10 years in industry).

Public contracts standard format was generated after a lot of constructions project, and data base generated for the usual documented disputes. This standard format of construction contract has limited flexibility to maneuver and alter the conditions to accommodate the type of project. This might lead to dispute especially due to payment issues as discussed earlier in contractors' section.

More than half of the reactions toward disputes from the governmental perspective are to mitigate the dispute. This reaction depends solely on the project management, where the standard work contract does not state clearly the option of reactions to resolve the dispute. Management of construction projects from the governmental ministry realizes that it is the shortest and the cheapest approach to resolve the dispute and therefore it is the most commonly adopted reaction.

A percentage of 23% from the respondents hold the dispute work area, which seems that they are strictly following the governmental regulations to resolve the dispute, which does not give the full flexibility to choose other easier options. Till the solution of dispute is decided by the reviewing and monitoring board reaches the project, this would be the solution.

The remaining 8% respondents hold the whole project when the causing reasons are out of hands and cannot be resolved in-house.

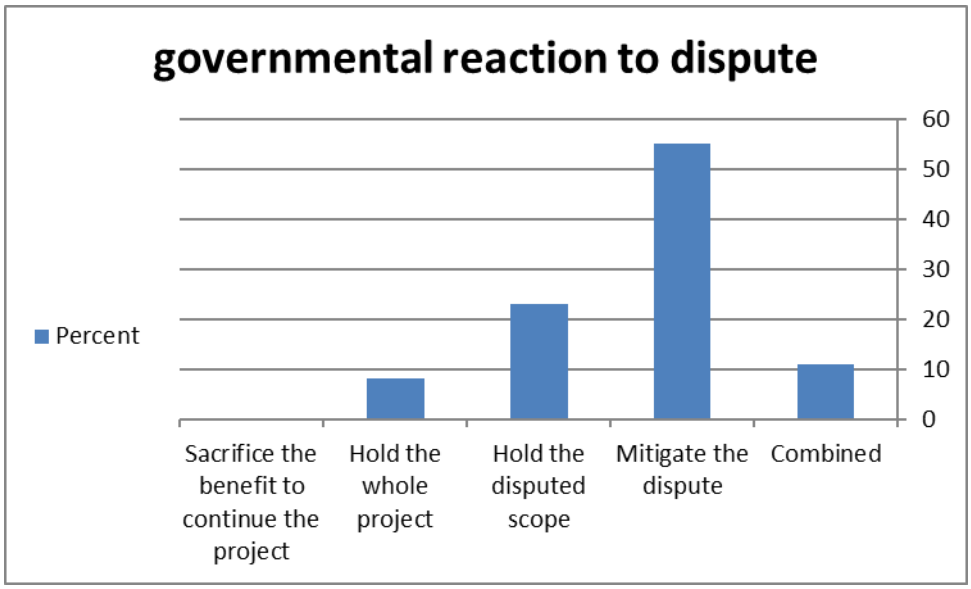


FIGURE 36. Governmental usual reaction toward the dispute

Detail of the combined reaction by the Governmental is tabled below:

TABLE 56. Governmental' usual reaction toward the dispute

Reaction toward the dispute	No. of respondents
Hold the disputed scope + Mitigate the dispute	2
Mitigate the dispute + Sacrifice the benefit to continue the project	1
Hold the disputed scope + mitigate the dispute + Sacrifice the benefit to continue the project	0
Hold the whole project + Mitigate the dispute	0
Hold the disputed scope + Hold the whole project + mitigate the dispute +Sacrifice the benefit to continue the project	0
Hold the disputed scope + Sacrifice the benefit to continue the project	0
Hold the disputed scope + Hold the whole project	0
Hold the disputed scope + Hold the whole project + mitigate the dispute	1
Hold the disputed scope + Mitigate the dispute + De-scope	0
Hold the disputed scope + Refer to legal department	0

Two of the respondents mitigated the dispute and holds or suspended the disputed work area only. Those who took this reaction might be with a contractor's background experience; also, they are familiar with the new introduced modifications of the standard public work contracts updated by the governmental ministries.

Mitigation the dispute is the shortest method to resolve the dispute as indicated by the contractors and the private owners. Moreover, this method of sacrificing the benefits in order to complete the project gives an effective method for the dispute resolution. Only 1 out of the respondents answered the questionnaire that this is the reaction they do to resolve the dispute. This low percentage of responses seems to be referred to the governmental rules that regulate the construction industry.

Final reaction taken by the governmental ministries is holding the disputed scope, then holding the whole project and mitigating the dispute. This reaction is a firm reaction by the governmental ministries to resolve the dispute, because holding the whole project is a limited approach chosen as a reaction, and mitigating the dispute alone is not as effective as a combined reaction. This reaction is again limited and forced by the governmental regulations.

Comparison of usual reaction toward dispute by governmental ministries with first Degree contractors:

Table 57. Comparison between the first-Degree contractors' reaction to resolve dispute and governmental ministries

Common practice	No. of respondents - 1st Degree contractors	Percent - first Degree contractor (%)	No. of respondents - governmental	Percent - Governmental (%)
Combined	40	64.51	4	11.77
Mitigate the dispute	17	27.42	19	55.88
Hold the disputed scope	2	3.23	8	23.53
Hold the whole project	2	3.23	3	8.82
Sacrifice the benefit to continue the project	1	1.61	0	0
Total	62	100	34	100

By comparing the usual reactions taken by the governmental ministries to resolve the dispute, with the usual reaction taken by the first-Degree contractors, it is observed that first-Degree contractors took combined reaction, while the governmental ministries tend to hold the disputed work.

Only 11.77% from the governmental ministries decided to take a combined reaction, while the first-Degree contractors tend to react toward the dispute with a 64.51% from the total respondents. This sole action by the governmental ministry might be due to

the restrictions of the governmental regulations. First Degree contractors tend to show more flexibility in resolving the dispute.

A percentage of 55.88% from the governmental ministries react to dispute by mitigating it with the contractor. Meanwhile around quarter of the respondents from the first-Degree contractors do the mitigation. Mitigation act from the first-Degree contractors might be with private owners or with owners outside the study community which justifies the difference in percentage.

Seems that holding the disputed scope of work is the trend of reaction taken by the governmental ministries (responded by 23.53% from all the participants) till the decision is taken by the review and monitoring board of the government, but this is not the situation in the first-Degree contractors, where they seem to have un-centralized management style and flexibility in resolving the dispute.

Holding the whole project is responded from 8.82% from the participant from the governmental ministries, which could be due to the governmental regulations. On the other hand, first Degree contractors responded that this reaction is taken by 3.23% because it might affect the turnover rate of contractor and let them lose more opportunities to acquire more projects.

Sacrificing the benefits to complete the project is not chosen reaction by any of the governmental participants, which might due to not solely resolving the dispute. Contractors from first Degree choose this reaction by a minority (1.61%) which could be due to over budgeted cost to resolve the dispute.

Comparison between the governmental reactions to resolve the dispute with the second-Degree contractors:

TABLE 58. Comparison between the second Degree contractors reaction toward dispute with governmental ministry

Common practice	No. of respondents – 2nd Degree contractor	Percent – second Degree contractor (%)	No. of respondents – governmental ministry	Percent – governmental ministry (%)
Combined	49	72.06	4	11.77
Mitigate the dispute	16	23.53	19	55.88
Hold the disputed scope	1	1.47	8	23.53
Hold the whole project	1	1.47	3	8.82
Sacrifice the benefit to continue the project	1	1.47	0	0
Total	68	100	34	100

Generally, the second-Degree contractors have the same attitude of first Degree contractors toward resolving the dispute, but with fewer tendencies to hold the disputed scope of work and or to hold the whole project than what is adopted by the first Degree contractors.

By comparing the usual reaction taken by the governmental ministries to resolve the dispute, with the usual reaction taken by the second-Degree contractors it is shown that second Degree contractors adopt a combined reaction, while the governmental ministries tend to hold the disputed work.

It is clarified at the analysis of the first-Degree contractors that only 11.77% from the governmental decided to take a combined reaction, while the second-Degree contractors tend to react the same way towards the dispute with a percentage of 72.06% from the total respondents. This sole action by the governmental ministry might be due to the restrictions of governmental regulations. Whereas, second degree contractors have budget limitations.

A percentage of 55.88% from the governmental ministries react to dispute by mitigating it with the contractor. Meanwhile, around quarter of the respondents from the first-Degree contractors do the mitigation. Mitigation from the second-Degree contractors might be with private owners or with owners outside the study community which justifies the difference in percentages from the owners.

Obviously, holding the disputed scope of work is a trend of reaction taken by the governmental ministries (responded by 23.53% from all the participants) till the decision is taken by the review and monitoring board of government, but this is not the situation in the second-Degree contractors, where they seem to rush in resolving the dispute for finance limitations.

Holding the whole project is responded by 8.82% of the participant from the governmental ministry, which could be due to the governmental regulations. On the other hand, second-Degree contractors responded that this reaction is taken by 1.47% because it might affect the project budget.

Sacrificing the benefits to complete the project is not a chosen reaction by any of the governmental ministries, which might be because this does not resolve solely the dispute. Contractors from second-Degree choose this reaction with a minority of (1.47%) which could be due to over budgeted cost to resolve the dispute.

Respondents were in general in concurrence to three reaction practices that could be taken towards disputes:

1. Re-negotiate the terms of the disputed work *(Mean ± SD: 4.16 ±1.09)*
2. Change the contract terms *(Mean ± SD: 3.82 ±1.18)*
3. Hold the work in the disputed scope *(Mean ± SD: 3.48 ±1.06)*

While, they agree to some extent to the following reaction practices:

1. De-scope the disputed work *(Mean ± SD: 3.39 ±1.15)*
2. Consult an arbitrator *(Mean ± SD: 3.16 ±1.23)*
3. Sacrifice the benefit of the disputed work to complete the work *(Mean ± SD: 2.99 ±1.13)*

But, somehow, they disagree to the following reaction practices:

1. Changing the contract with the manpower supplier to overcome the limited cost of skilled manpower *(Mean ± SD: 2.56 ±1.15)*
2. Pursue a case in the court (Mean ± SD: 2.45 ±1.31)
3. Hold the work in the whole project *(Mean ± SD: 2.04 ±1.19)*

TABLE 59. Descriptive statistics for the Common reaction practices toward disputes

S/N	Reaction Practice	Mean	SD	Ranks
1	Hold the work in the disputed scope	3.48	1.06	3
2	Hold the work in the whole project	2.04	1.19	9
3	Sacrifice the benefit of the disputed work to complete the job	2.99	1.13	6
4	De-scope the disputed work	3.39	1.15	4
5	Re-negotiate the terms of the disputed work	4.16	1.09	1
6	Change the contract terms	3.82	1.18	2
7	Changing the contract with the manpower supplier to overcome the limited cost of skilled manpower	2.56	1.15	7
8	consult an arbitrator	3.16	1.23	5
9	make a case in the court	2.45	1.31	8

5 Points Likert scale:

Strongly Agree	given weight (5) ranged from 4.20 to 5.00
Agree	given weight (4) ranged from 3.40 to <4.20
Somewhat agree	given weight (3) ranged from 2.60 to <3.40
Somewhat Disagree	given weight (2) ranged from 1.80 to <2.60
Strongly Disagree	given weight (1) ranged from 1 to < 1.80

4.4.3 Contract conversion as a proposed solution to dispute

After studying the most important factors for dispute between the contractors and the owner, and how usually the different contractors and owners react towards these disputes, our objective is to study the functionality and effectiveness of the proposed solution beside how to prevent the dispute from the first place.

In this sub-chapter the study starts with the familiarity of the contract conversion concept in the community of the study, what type of contract did they need to convert and the reasons behind this conversion. Lastly, the results of this conversion and comparison between the all the construction industry spectrum involved in the study.

4.4.3.1 Contractors contract conversion

Contractors are looking to run the construction operation as smooth as possible, by adopting the management skills developed through years and the latest methods and technologies invented and developed.

The researchers in this thesis intend to clarify whether the contractors are willing to adopt the proposed solution to resolve the dispute, and if they are familiar with this method, because they are highly educated, experienced, and finalized many projects through the years.

Study community was chosen carefully to take the point view of experts about the proposed solutions, because they are the most capable personnel in the field to judge the contract conversion.

This experience and education level of contractors is reflected by the percentage of the respondents who experienced the contract conversion that reaches to 64.62% (shown in the below figure). This percentage represents around two third of the elite contractor's community, and by this percentage it furnishes a ready environment to accept the proposal of converting the contract to deal with the dispute-environment of construction industry, it also indicates that the contract conversion is practiced but not formalized.

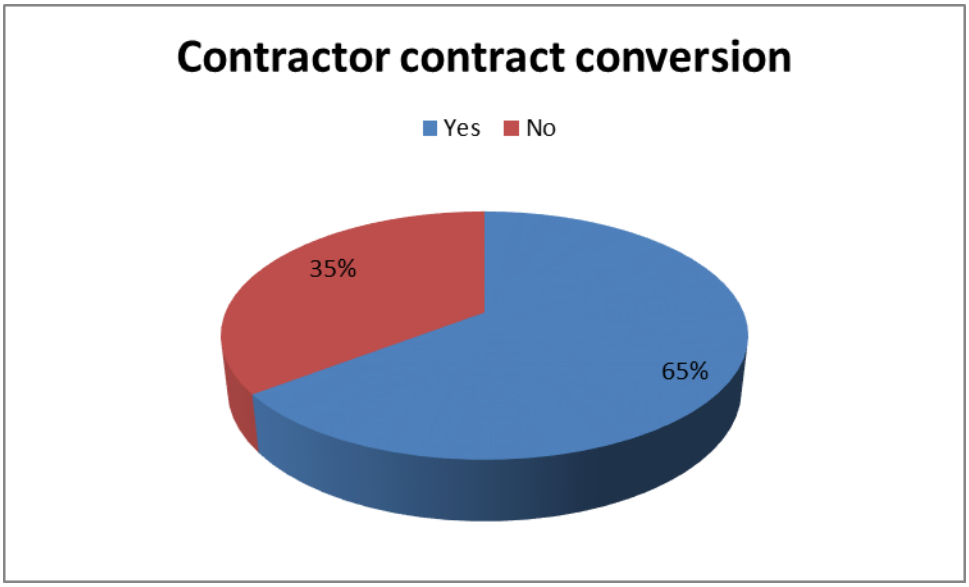


FIGURE 37. Contractor's response for experiencing a contract

- First Degree contractors:

Through analytical study, the first-Degree contractors' percentage was 85.48% from all the study community of contractors who practiced the contract conversion. This high percentage of the contract conversion experience puts more credibility to the results that come out of this study and the proposed solution by the researcher.

TABLE 60. The percentage of experiencing the contract conversion at the 1st Degree contractors

Experienced a contract conversion	Number of respondents	Percent (%)
Yes	53	85.48
No	9	14.52
Total	62	100

- Second Degree contractors:

Experiencing the contract conversion in the second-Degree contractors' firms is less than the first Degree contractors, which may refer to the size and complexity of project that they execute which is less than the projects handled by the first Degree contractors.

TABLE 61. The percentage of experiencing the contract conversion at the 2nd Degree contractors

Experienced a contract conversion	Number of respondents	Percent (%)
Yes	31	45.59
No	37	54.41
Total	68	100

Education level and experience of the second-Degree contractors are less than the first-Degree contractors. First Degree contractors' average experience is 10 to 20 years with 10 to 20 projects completed during the last ten years, while the second-Degree

contractors' average experience is 5 to 10 years with 5 to 10 projects completed during the last 10 years.

TABLE 62. Comparison between the first-Degree contractors and the second-Degree contractor experience of contract conversion.

Experienced a contract conversion	Number of respondents – 1st Degree contractor	Percent – 1st Degree contractors (%)	Number of respondents – 2nd Degree contractors	Percent – 2nd Degree contractors (%)
Yes	53	85.48	31	45.59
No	9	14.52	37	54.41
Total	62	100	68	100

Responses from the first and the second-Degree contractors had experienced the contract conversion. Moreover, they have been also requested to advise what type of contracts they have changed and to which type.

Contractors have changed mostly the lump-sum contract type to a unit cost type, with a percentage of 85.71%. This high conversion percentage among the respondents of changing the lump-sum contract to unit-cost might be justified according to the Saudi contractor authority that there is weakness in understanding the contract tools and consultant firms to supervise the contract.

Concept of the lump-sum contract is not understood correctly to the private owners, and to the contract departments.

A percentage of 5.95% from the responded contractors changed the contract type from unit-cost to cost-plus. This response is interesting because many owners do not like to amend the cost-plus contracts (that refers to the tedious and open budget of the project) unless the nature of the project forces them to do so. This situation was

demonstrated by the respondents that a re-innovation of an operational existing hospital, in which the owner failed to manage keeping any contractor to complete the project, to resolve this problem he had to convert the contract with the available contractor to a cost-plus contract.

This step of conversion reflects that the contract conversion can be used not only to overcome the dispute in projects, but also to establish a win-win relationship with the contractor, avoid opportunism, and correct the un-balanced contracts.

Changing the contract type from lump-sum to cost-plus is responded by a 2.38% from the contractors. Cost-plus contract is usually amended when the projects' specification and quantity is not known, but in this response the contractor stated that the situation was quite little bit different. Tentative rent to a retail area of a project was intended, but the intention was changed due to the delay of handing over the area to the tenant after holding the finishing work. Owner left with in-complete work in the area to be rented, which forced him to return back to the original contractor to complete the unfinished working area but with a different contract.

In the last situation of contract conversion, it is shown that the basic principles of selecting the best type of contract might be misunderstood by the contractor and owner, and flexibility of the contract conversion method to adopt the various projects conditions.

Last percentage of 5.95% from the respondents changed the contract type from/to different types that could be from cost-plus to unit-cost for the easiness of managing the contract; limit the budget of the project and to calculate the quantities of the project.

Another contract conversion is from the cost-plus to lump-sum contract; which can be an option when a clear project boundaries, specification and quantities are cleared after a certain period of project running.

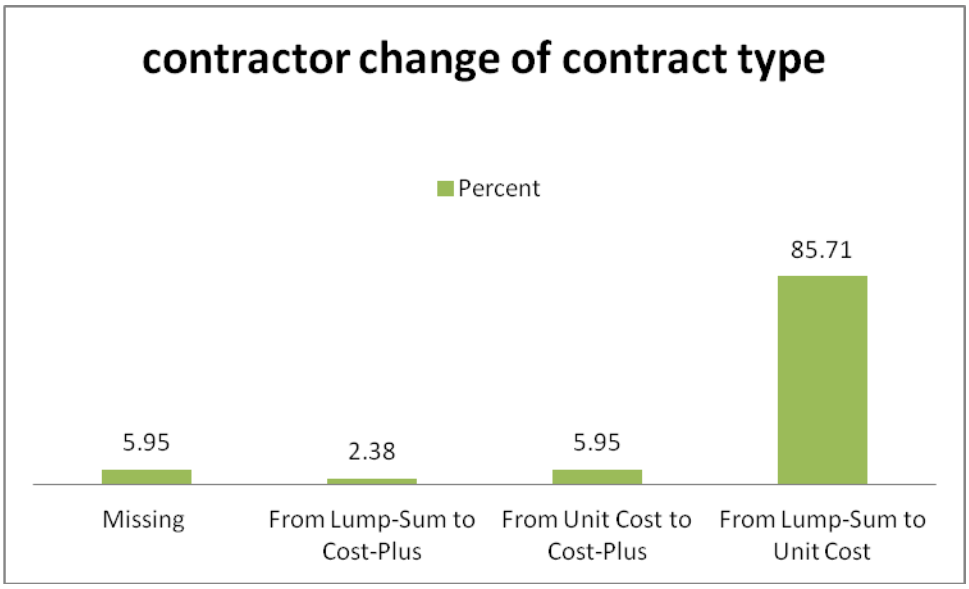


FIGURE 38. Contractors type of contract conversion

- First Degree contractors:

Converting the lump-sum contract is the dominant conversion from the responses out of the first-Degree contractors with a percentage of 83.02%. This result matches with the general responses from all contractors.

Only in special cases of changing the contract from unit-cost/lump-sum to a cost plus was mentioned above, those two cases are practiced with first Degree contractors.

Other type of contract conversion from/to are not mentioned in the questionnaire are practiced by the first degree contractor are representing the percentage of 7.55%.

Table 63. First Degree contractors change type of contract

Alteration	Number of respondents	Percent (%)
From Lump-Sum to Unit Cost	44	83.02

From Unit Cost to Cost-Plus	3	5.66
From Lump-Sum to Cost-Plus	2	3.77
Missing	4	7.55
Total	53	100

- Second degree contractors:

Contractors from the second Degree do not differ from general trends and responses gathered from all contractors.

Conversion of contract happened in the second-Degree contractors are limited to: lump-sum conversion to unit-cost and the other is from/to another type of contracts that is not listed.

The level of trust in the second-Degree contractors is not equal to the first-Degree contractors and may be due to this point the owners changed only the lump-sum contracts to unit-cost.

Changing the contract from unit-cost to lump-sum might be the type of conversion practiced by the second-Degree contractors, after the generation of the accurate BOQ of project. This practice is indication of owner or the engineering firm generating the project document.

Table 64. Second Degree contractors change type of contract

Alteration	Number of respondents	Percent (%)
From Lump-Sum to Unit Cost	25	80.65
From Unit Cost to Cost-Plus	2	6.45
From Lump-Sum to Cost-Plus	1	3.23
Missing	3	9.77
Total	31	100

Contract conversion done by both contractors, and knowing the type of contracts converted, emphasizes questioning the reasons behind this conversion, which are asked to all contractors and their answers were as follows:

Contractors mainly change the contract type because of the undefined quantity of contract, especially the lump-sum contract (this was elaborated previously), this answer had a percentage of 35.71% among all the contractors participated in the study. This percentage of converting this type of contracts shows that the concept of lump-sum contract is not obvious to the contract parties and indicates a weakness at the firm preparing the contract document.

Financial restrain is another reason for changing the contract concurred with a percentage of 25%, and this case happened in the cost-plus contracts. One of the observations noted by the Saudi contractor's authority are the limited options of project funding in the market, and those available funding sources are very limited in cash-flow, accordingly the owners tried to comply by converting the contract.

A percentage of 26.19% from the respondents changed the contract due to un-defined scope, like changing the quantity in lump-sum contracts, or the specification of the items in unit-cost contracts. All these factors are sources of dispute in construction as illustrated in the factors of disputes.

Un-defined reason of contract conversion is replied by 13.1% from all respondents.

Conversion of contract reasons vary also from project to another, but it can be summarized according to the figure below, which reflect the major defect in the preparation of the BOQ for the lump-sum contracts, and the bidding, accordingly.

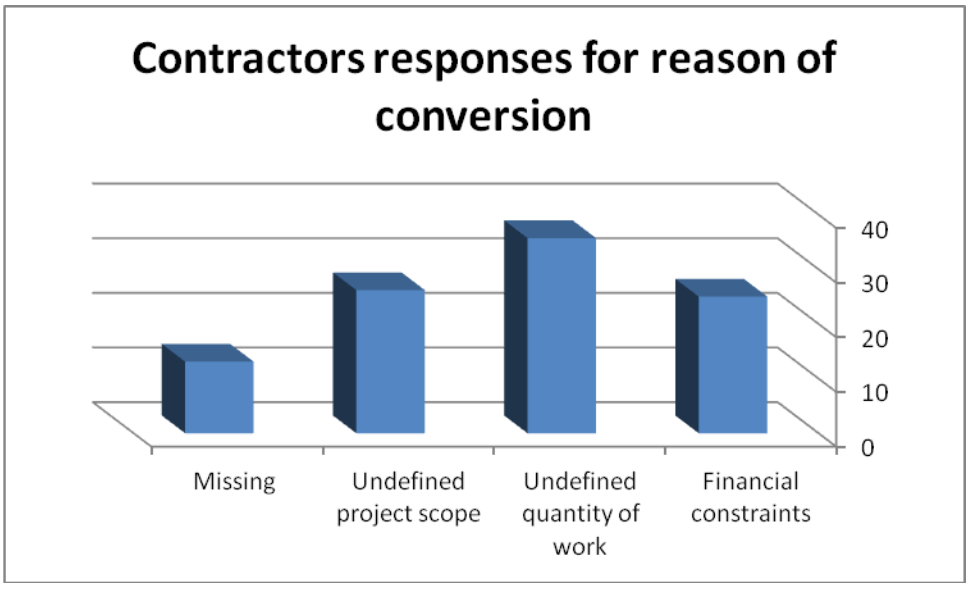


FIGURE 39. Contractors reason for changing the contract type

- First degree contractors:

Reason of contract conversion in the first-Degree contractors are mostly due to un-defined/accurate quantity of work (43.4%), this percentage is more than the general response rate for the contract conversion among all the contractors, which might be referred to as the size of projects awarded.

Secondly, the undefined project scope with a percentage of 30.19%. This response is also more than the general responses from all the contractors, which can be justified by the complex nature of construction and interfacing with lots of variables in the big projects.

Financial restrains rank the third with a percent of 20.75% according to the first Degree contractors, which might be due to the long and trusted relationship with the available funding sources. However, the conversion due to this reason is a major and could be referred to the inflation of materials and equipment pricing requested to be compensated by the owner, especially after introducing the value added tax (VAT).

Other non-specified reasons replied with a percentage of 5.66%.

Table 65. The first-Degree contractor reason for contract

Conversion reasons	**Number of respondents**	**Percent (%)**
Financial constraints	11	20.75
Undefined quantity of work	23	43.40
Undefined project scope	16	30.19
Missing	3	5.66
Total	53	100

- Second Degree contractors:

Second Degree contractors change the contracts mainly for financial reasons with a concurrence percentage of 32.26%. This reason was ranked third. According to the first-Degree contractors it may occur because of the limited resources of funding and the limited capital of those firms.

Matching the first Degree in the second important reason for contract conversion is the undefined quantity of work, but the percentage of agreed respondents is 25.81%. Undefined quantity of work disrupts the contract management (especially scope management), which is considered the most important nature of dispute according to the first and second-Degree contractors.

Un-defined scope of work is ranked the third reason of contract conversion, which is less important to the second-Degree contractors than the first Degree contractors. This is maybe due to the size of the contract and the projects awarded is a smaller number than the first-Degree contractors' projects.

Last percentage of 22.58% did not realize the main reason of contract conversion, which is the highest percentage among all the respondents, which can be justified by the average level of experience in the firms.

Those results raises-up a red-flag for the real issue in contract, which is the preparation of the BOQ in the lump-sum contracts, usage of inaccurate wording or terminologies in contract drafting (shown from the factors of dispute), preparation of accurate cash-flow by contractor and revising and reviewing this plan periodically, which is shown from the reasons of contract conversion, and lastly, for the client, to pay the contractor on-time.

TABLE 66. The second-Degree contractor reason for contract conversion

Conversion reasons	Number of respondents	Percent (%)
Financial constraints	10	32.26
Undefined quantity of work	8	25.81
Undefined project scope	6	19.35
Missing	7	22.58
Total	31	100

TABLE 67. Comparison of contract conversion reason between first Degree contractors and second-Degree contractors

Conversion reasons	No. of respondents – 1st Degree contractor	Percent – 1st Degree contractors (%)	No. of respondents - 2nd Degree contractors	Percent – 2nd Degree contractors (%)
Financial constraints	11	20.75	10	32.26
Undefined quantity of work	23	43.4	8	25.81
Undefined project scope	16	30.19	6	19.35

Missing	3	5.66	7	22.58
Total	53	100	31	100

Now, to know the conversion results, the experts from the contractors who participated in the study were asked and their answers revealed that 44.05% of them finalized the project successfully, which proves the effectiveness of the proposed approach to resolve the disputes.

Resolving only the cited dispute was noted by 27.38% from the total respondents, but it does not enhance the construction environment by preventing the same dispute, or any other dispute from occurring again.

A percentage of 17.86% from respondents stated that the conversion enhances the relationship with the client, but it does resolve the dispute, meaning that, it built a common ground for mitigation with the owner.

The remaining 10.71% of the contractors did not respond to this question.

TABLE 68. Contractors' responses for the results of contract conversion

Conversion results	Number of respondents	Percent (%)
Project was completed successfully	37	44.05
Diminished Disputes	23	27.3
Better relationship between parties	15	17.86
Missing	9	10.71
Total	84	100

- First Degree contractors:

Contractors from the 1st Degree stated that the conversion results were completing the project successfully with a percentage of 49.06% which is a bit more than the general contractor response.

At least 28.3% of them stated that the problem diminished, but it does not guarantee that the dispute will not rise again, so it may be considered as a neutral reply that does/ doesn't support contract conversion.

Another 16.98% stated that the relationship with the client was enhanced and the dispute is solved, and the remaining stated that the results were other than the listed options.

TABLE 69. First-Degree contractors' response for the contract conversion result

Conversion results	**Number of respondents**	**Percent (%)**
Project was completed successfully	26	49.06
Diminished Disputes	15	28.3
Better relationship between parties	9	16.98
Missing	3	5.66
Total	53	100

- Second Degree contractors:

From this data, first Degree contractor's replies match with the same results from the second-Degree contractors which prove the effectiveness of considering this approach as an alternative option for dispute solution.

Table 70. Second-Degree contractors' response for the contract conversion result

Conversion results	**Number of respondents**	**Percent (%)**
Project was completed successfully	10	40
Diminished Disputes	6	26.67
Better relationship between parties	4	16.67

Missing	4	16.67
Total	24	100

4.4.3.2 Owners contract conversion

Owners in this study are classified into two categories: Private and governmental ministries.

In this sub-chapter we complete the study of the contract conversion from the point of view of all owners' categories and compare between their responses.

4.4.3.2.1 Private owners contract conversion

The interviewed private owners are highly educated and experienced, but they did not widely practice the contract conversion and this result is observed in the questionnaire answers, where only 35% of them replied that have practiced the contract conversion, while the remaining have not.

This practice indicates the standardized thinking followed by the private owners, and the lack of training to the latest management approaches although most of them are Ph.D. Degree holders and working in the field for more than 10 years.

The attitude and the reaction taken by the private owners affect the industry in Riyadh, as concluded from their reactions to disputes. That is because accepting the conversion of the contract to resolve the disputes, will help the globalization of construction industry, and supports the next generation of business developments planned in Saudi vision 2030.

TABLE 71. Private owner's respondents to experiencing the contract changing

Experienced a contract conversion	Number of respondents	Percent%
Yes	7	35
No	13	65
Total	20	100

- First Degree contractor:

First Degree contractors practiced the contract conversion with a percentage of 85.48% from all respondents, unlike the private owners who practice it with a percentage of only 35%. This big variance in practicing the contract conversion is because the conversion occurred is from outside the study community (Riyadh, Saudi Arabia).

TABLE 72. Comparison between the contract conversion practice in first Degree contractors and the private owners

Experienced a contract conversion	Number of respondents – 1st Degree contractor	Percent – 1st Degree contractor (%)	Number of respondents – Private owner	Percent – private owner (%)
Yes	53	85.48	7	35
No	9	14.52	13	65
Total	62	100	20	100

- Second Degree contractors:

Second Degree contractor are also practicing the contract conversion more than the private owners with percentage of 45.59% at the second-Degree contractors' firm to

35% from the private owners firm. This result is also referred for the same reason of first Degree contractors.

TABLE 73. Comparison between the contract conversion practice in second Degree contractors and the private owners

Experienced a contract conversion	Number of respondents – 2nd Degree contractor	Percent – 2nd Degree contractor (%)	Number of respondents – Private owner	Percent – private owner (%)
Yes	31	45.59	7	35
No	37	54.41	13	65
Total	68	100	20	100

Private owners who practiced the contract conversion replied that they have changed the lump-sum contract to unit-cost contract; this answer is agreed upon with a percentage of 71.43% from the private owners who practiced the contract conversion, which is around the same margin of contract converted by the contractor (85.71%). This percentage is quite high and thus indicates that the private owners are not satisfied with the engineers who are preparing the contract documents, forcing them to resolve the dispute with an innovated approach (contract conversion).

By changing the contract to a unit-cost, contractors and private owners saves a lot of effort to manage the inaccurate bill of quantity of the project, preparing the take-off and breakdown for the items in the scope of the project.

A percentage of 14.29% from the private owners changed the contract from unit-cost to cost-plus, which is mentioned in the contractor part of this study. This conversion was done due to the nature of project.

Cost-plus contracts are not common in the construction industry in Riyadh, though it is used. Changing the contract form a unit-cost to a cost-plus contract happened in

Riyadh between the client and the contractor in one case of the respondent mentioned in the contractor's section above.

The remaining contract conversion occurred among types that were not mentioned.

Table 74. Private owner changing the type of contract

Alteration	Number of respondents	Percent (%)
From Lump-Sum to Unit Cost	5	71.43
From Unit Cost to Cost-Plus	1	14.29
From Lump-Sum to Cost-Plus	1	14.29
Missing	0	0
Total	7	100

- First Degree contractors:

Upon comparing the first Degree to private owners, first-Degree contractors converted the lump-sum contract to unit-cost more often than the private owners, with percentages of 83.02% from the first-Degree contractors to 71.43% from the private owners, which can be justified that the owner of the project is outside the study community.

Unit-cost conversion to a cost-plus contract has a slight difference in percentage, because the owner and the contractor of the study are working in the same study community, where the owner has awarded the contractor three different contract in the same way, and the difference is the percentage to all participants. First degree contractor changed the contract from unit-cost to cost-plus with a percentage of 5.66% from the entire participant, while the same conversion represents a percentage of 14.29% from the private owners.

The same applies to converting the lump-sum contract to cost-plus contract conversion. First degree contractors responded with a percentage of 3.77%, and the private owner response represents a 14.29%.

In addition to all the conversion types mentioned before, the first degree contractors changed the contracts to some other types that are not listed in the survey.

TABLE 75. Comparison between the private owner and first-Degree contractors in terms of type of contract conversion

Alteration	Number of respondents – 1st Degree contractor	Percent – 1st Degree contractor (%)	Number of respondents – private owner	Percent – private owner (%)
From Lump-Sum to Unit Cost	44	83.02	5	71.43
From Unit Cost to Cost-Plus	3	5.66	1	14.29
From Lump-Sum to Cost-Plus	2	3.77	1	14.29
Missing	4	7.55	0	0
Total	53	100	7	100

- Second Degree contractors:

In comparing the second-Degree to private owners, second-Degree contractors converted the lump-sum contract to a unit-cost with the same percentage of the private owners, with a percentage of 74.19% from the second-Degree contractors to 71.43% from the private owners, which can be justified that the owner of the project is outside the study community.

Unit-cost conversion to a cost-plus occur with a percentage of 9.68%, Degree but it occurs in the private owner firms (projects mentioned) with a percentage of 14.29%.

The same applies to converting the lump-sum contract to cost-plus contract, where the second degree contractors practiced it with a percentage of 6.45%, but the private

owner did it with a percentage of 14.29%. The difference in percentage between the two percents might be refer to the members outside the community study, or the contract conversion occurs in other type of contracts that is not the scope of study.

In addition to all the conversion types mentioned before, the private owners did not change the contracts to other types that are not listed in the survey. On the other hand, second Degree contractors converted the contract to other types that are not mentioned in the questionnaire with a higher percentage of 9.68%.

TABLE 76. Comparison between the private owner and the second-Degree contractor in terms of type of contract conversion

Alteration	Number of respondents – 2nd Degree contractor	Percent – 2nd Degree contractor (%)	Number of respondents – private owner	Percent – private owner (%)
From Lump-Sum to Unit Cost	23	74.19	5	71.43
From Unit Cost to Cost-Plus	3	9.68	1	14.29
From Lump-Sum to Cost-Plus	2	6.45	1	14.29
Missing	3	9.68	0	0
Total	31	100	7	100

Private owners usually study the budget of the project and limit the costs to a certain level. This limitation of the project cost raises-up the main reason of contract conversion, which is the financial constraints, this answer was responded by 57.14% of the private owners.

Analysis conducted for the reason of dispute, shows that the financial factor alone cannot cause all the disputes, but it contributes majorly to the total disputes in construction.

A percentage of 14.29% is due to undefined quantity of work, where it is the key factor for dispute in the lump-sum contracts. It is almost agreed between the contractor and the private owner that the inaccurate BOQ of the lump-sum is an important factor

for dispute, and on the other hand the accurate BOQ helps in determining the project scope, and consequently the payment terms and the methods.

A percentage of 14.29% referred the contract conversion to undefined project scope, which is again the duty of the project document preparatory to do. The weakness and the inaccuracy of this work cause lots of disputes during the execution of the project, as shown in the factor of dispute part of this study.

The remaining 14.29% from the private owners did not specify the reasons**.**

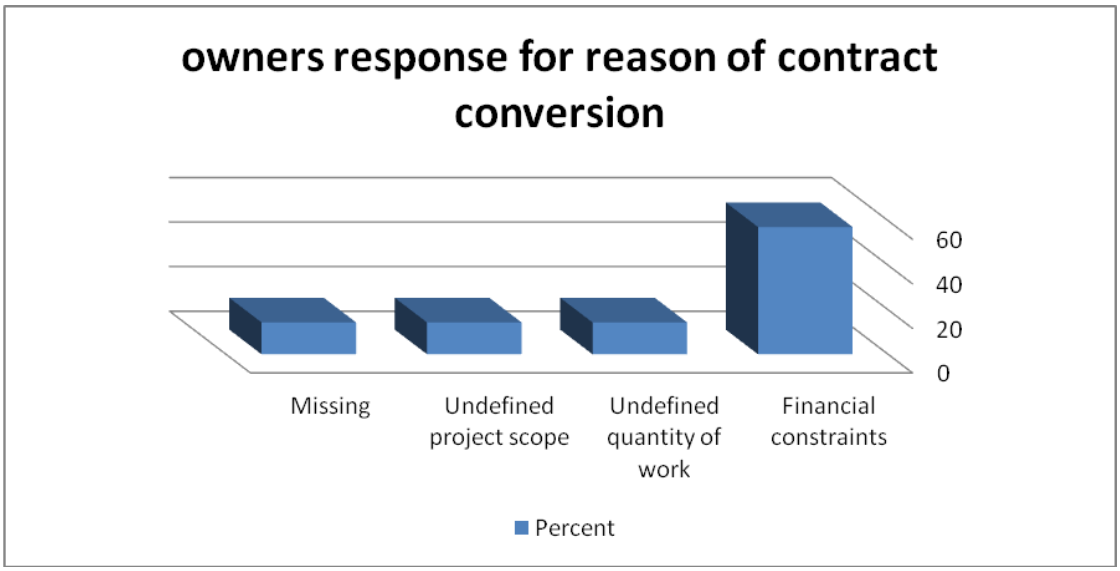


FIGURE 40. Private owner's response for the reason of converting the contract

- First Degree contractors:

Private owners' main reason for converting the contract is the financial restrains which is stated by 57.14% of the respondents and the same reason was reported by 20.75% of the first-Degree contractors. This difference in the percentage could be referred to the reason that the owner is the one who is paying for the project, and at the end he is the one who can answer the question of how much did this project cost.

First Degree contractors are concerned more about the quantity of work to be done, because this costs them efforts, time and money. From this point, the contractors answered the reason of converting the contract mostly with the undefined quantity of work with a percentage of 43.40%. Private owners agreed that this would be a reason for converting the contract with a percentage of 14.29%.

Contractors prefer to have clear scope of the work, and therefore, this reason was a major point for converting the contract with a percentage of 30.19%. Private owners mostly ignore this task to be done by the preparatory of the contract document, and thus rank this reason to a lower-level with a percentage of 14.29%.

The involvement of the private owner in the project plays a great role in his knowledge and awareness of the details, and accordingly, this might justify why the private owners replied that there are more reasons that they are not aware of. On the other hand, contractors are the one who is running the activities day to day and must be aware of all the variables and details to make correct decisions in a timely manner and from this point the missing reason percentage goes to 14.29%.

TABLE 77. Comparison between the private owner and the first-Degree contractor in terms of reason for changing the contract

Conversion reasons	No. of respondent – 1st Degree	Percent – 1st Degree contractor	No. of respondent – private	Percent – private owner
Financial constraints	11	20.75	4	57.14
Undefined quantity of	23	43.40	1	14.29
Undefined project scope	16	30.19	1	14.29
Missing	3	5.66	1	14.29
Total	53	100	7	100

- Second Degree contractors:

Second Degree contractors have more financial concerns than the first-Degree contractors, but the private owner is the one who is paying for the project, therefore, it is a top priority for the private owner with a percentage of 57.14%, comparing to 32.26%.

The second-Degree contractors are more concerned about the quantity of work to be done, but they share the same concerns and percentage for the reason of converting the contract. The contractors exceeded the private owner in concern regarding the scope of project, with a percentage of 25.81%, while the private owner shows that it is a reason for converting the contract in 14.29% from all the converting times. This might be due to the deep involvement of contractors in construction activities, and the weakness of private owner training regarding the importance of this reason.

Scope of work to the owner pushes him to convert the contract according to 14.29%, on the other hand that reason is more critical for timing and project profit to contractor that is why it goes up to 19.35% up to them.

Missing information from the second-Degree contractors reached a percentage of 22.58%, while for the private owner reached 14.29%.

TABLE 78. Comparison between the private owner and the second-Degree contractor in terms of reason for changing the contract

Conversion reasons	No. of respondent – 2nd Degree contractor	Percent – 2nd Degree contractor (%)	No. of respondent – private owner	Percent – private owner (%)
Financial constraints	10	32.26	4	57.14
Undefined quantity of	8	25.81	1	14.29
Undefined project scope	6	19.35	1	14.29
Missing	7	22.58	1	14.29

Total	31	100	7	100

After studying the reasons behind contract conversion by the private owners we were interested in knowing the results of this conversion.

Private owners who changed the contract from one type to another, managed to have their projects completed successfully with a percentage of 42.86%, showing good results for conversion with an accurate high-rate of the result of completing the project without any further disputes.

A percentage of 28.58% of them diminished the dispute, but this does not guarantee that the dispute will not occur again for the same reason or for a different reason, but at least it resolves the dispute that is under the investigation. Private owners declared that the contract conversion enhances the relationship between themselves and the contractor, by eliminating the factors of dispute and clearing the working environment from any distraction elements and keeping everybody focused on the projects' outcome.

The remaining 14.29% did not state what the results of contract conversion.

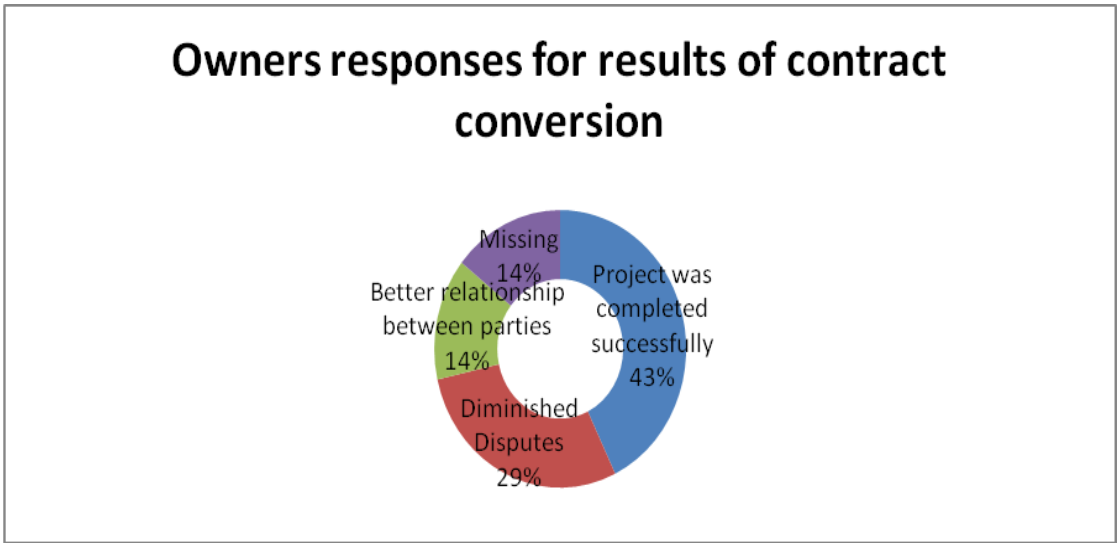


FIGURE 41. Private owner's response for the result of contract conversion

- First Degree contractors:

In general, all the results of the first-Degree contractors regarding the contract conversion match with the private owners.

The variance tends a bit to be related with the first-Degree contractors because the missing information from them is less than the private owners, for the same reasons explained earlier.

TABLE 79. Comparison between the first-Degree contractors and the private owners regarding the results of contract conversion.

Conversion results	Number of respondents – 1st Degree contractors	Percent (%) – 1st Degree contractors	Number of respondents- private owner	Percent (%) – private owner
Project was completed successfully	26	49.06	3	42.86
Diminished Disputes	15	28.30	2	28.58
Better relationship between parties	9	16.98	1	14.29
Missing	3	5.66	1	14.29
Total	53	100	7	100

- Second Degree contractors:

Again, all the results of the second-Degree contractors regarding the results of the contract conversion match with the private owners.

The variance tends a bit to be related to the second-Degree contractors. Missing information from the first-Degree contractors is less than the private owners, for the same reasons explained earlier.

TABLE 80. Comparison between the second-Degree contractors and the private owners regarding the results of contract conversion.

Conversion results	Number of respondents – 2nd Degree contractors	Percent (%) – 2nd Degree contractors	Number of respondents- private owner	Percent (%) – private owner
Project was completed successfully	12	40	3	42.86
Diminished Disputes	8	26.67	2	28.58
Better relationship between parties	5	16.67	1	14.29
Missing	5	16.67	1	14.29
Total	31	100	7	100

4.4.3.2.2 Governmental ministries contract conversion

Governmental ministries are governed by the public standard contracts, and it is difficult for them to convert the contract type from one type to another, but in some cases the allowance is given to the project manager/director to move back and forward for the purpose of completing the project.

This rigidity in administering the contract is represented by the respondents who converted the contract with a percentage of only 5.8% from all the governmental respondents. The remaining did not practice the contract conversion. This rigidity has advantages and disadvantages. One advantage is the standardization of the contract, but on the other hand it forbids the flexibility to resolve the disputes within the project.

Table 81. Governmental respondent of experiencing contract conversion

Experienced a contract conversion	Number of respondents	Percent (%)
Yes	2	5.8
No	32	94.1
Total	34	100

- Contractors:

More than half of the contractors have practiced the contract conversion (64.62%), unlike the governmental ministries who practiced it with only 5.8%. This is because the governmental ministries have regulation preventing them from altering the original standard contract of construction.

- Private owners:

Private owners did not practice the contract conversion widely (only 35% have) and this might be due to the lack of training in contract conversions, while the governmental ministries have practiced it with only 5.8%. This is because the governmental ministries have regulation prevents them from altering the original standard contract of construction.

Out of the governmental respondents who practiced the contract conversion, there were only two representing the 6% percentage, who converted the contract from lump-sum to unit-cost.

Table 82. Governmental ministries contract conversion

Alteration	Number of respondents from governmental	Percent (%)
From Lump-Sum to Unit Cost	2	100
From Unit Cost to Cost-Plus	0	0
From Lump-Sum to Cost-Plus	0	0
Missing	0	0
Total	2	100

- Contractors:

Contractors convert the contract to another type in order to handle the variables and the updates in construction projects more than the governmental ministries. Contractors changed the contract with a percentage of 85.71% from lump-sum to unit-cost. On the other hand, all the conversion at the governmental ministries' firms occurred in the same category of conversion (100%).

In addition, the contractors changed the contract from unit-cost and lump-sum to cost-plus because of project nature, whereas, none of these types of conversion occurred in the governmental ministries' firms.

- Private owners:

Dominant contract conversion at the private-owners firms followed the trend of the contractors and the governmental ministries. Conversion of contract at the private owner's firm took place with a percentage of 71.43% from lump-sum to unit-cost, where they might face a dispute with the contractor of accounting the percentage of accomplishment in reference to the total quantity of contracted work. The same reply matches with the governmental ministries, with a different percentage. All of this indicates that the preparation of BOQ is not accurate.

While the governmental ministries did not change any contracts other than the lump-sum to unit-cost, private owners converted the unit-cost and lump-sum contracts to cost-plus for the nature of project.

No missing information of conversion at the governmental ministries' firm of type of contract, because it does not happen from the first place. This is not the situation in the private owners' firms where they changed the contract to different types that are not mentioned in the questionnaire.

TABLE 83. Comparison between all the study communities for the type of contract conversion.

Alteration	Number of respondent-contractors	Percent – contractors (%)	Number of respondents – private owner	Percent – private owner (%)	Number of respondent - governmental	Percent – governmental (%)
From Lump-Sum to Unit Cost	72	85.71	5	71.43	2	100
From Unit Cost to Cost-Plus	5	5.95	1	14.29	0	0
From Lump-Sum to Cost-Plus	2	2.38	1	14.29	0	0
Missing	5	5.95	0	0	0	0
Total	84	100	7	100	2	100

Reasons for contract conversion at the governmental ministries are categorized into two types: one of the respondents replied that the reason of conversion is due to undefined quantity of work reasons, where they converted the contract from lump-sum to unit-cost after the accurate take-off of the project.

The second reasons for conversion happened because of financial reasons and were after the accurate take-off of the project, and the total cost of the project is known to the governmental ministries.

Table 84. Reasons of contract conversion in the governmental ministries'

Conversion reasons	Number of respondents	Percent (%)
Financial constraints	1	50
Undefined quantity of work	1	50
Undefined project scope	0	0

Missing	0	0
Total	2	100

- Contractors:

Contractors practiced the contract conversion for all the reasons listed in the questionnaires. The dominant factor for converting the contract was the undefined quantity of work with a percentage of 35.71%, but the governmental ministries converted the contract to unit-cost with a percentage of 50%. This highest percentage of conversion at the governmental firms is due to the number of the total number who practiced.

Financial reason conversion is the second important reason at the contractor firms with a percentage of 25%, which might be considered due to the limited funding options in the construction market, and the limited financial funding in the second-Degree contractors. Governmental ministries changed the contract due to the financial reasons with a percentage of 50%. This conversion is done by the second respondents from the governmental ministries who responded to this question.

Converting the contract for undefined scope of the project is listed in the second place of importance to the contractors with a percentage of 26.19% from all the respondents, but the governmental ministries did not practice the conversion for this reason.

Finally, the missing information from the contractors reached a percentage of 13.1% from the respondents. On the other hand, the governmental ministries have no missing information, because the conversion did not happen at all.

- Private owners:

Private owners practiced the contract conversion also for all the reasons listed in the questionnaires. The dominant factor for converting the contract was the financial reasons with a percentage of 50%. Governmental ministries converted the contract to unit-cost with the same percentage of 57.14%. Equal percentage does not mean the similarity of the situation between the two firms, because the conversion quantity in governmental happened only two times.

Undefined quantity of work reason of conversion is the second important reason at the private owners' firms with a percentage of 14.29%. This percentage might be referred to the bank facilities obtained by the private owners, who wanted to know the total cost of the project along with the owner. Governmental ministries changed the contract due to the undefined quantity of work reasons with a percentage of 50%. This conversion is done by the second respondents from the governmental ministries who responded to this question.

Converting the contract for undefined scope of the project is listed in the third place of importance to the private owners with a percentage of 14.29% from the respondents, but the governmental ministries did not practice the conversion for this reason.

Finally, the missing information from the private owners reached a percent of 14.29% from the respondents. On the other hand, the governmental ministries have no missing information, because the conversion did not happen at all.

TABLE 85. Comparison of reason for contract conversion between the study community members

Conversion reasons	No. of respondents - contractors	Percent - contractors (%)	No. of respondents - private owners	Percent - private owners (%)	No. of respondents - governmental ministries	Percent - governmental ministries (%)
Financial constraints	21	25	4	57.14	1	50
Undefined quantity of work	30	35.71	1	14.29	1	50
Undefined project scope	22	26.19	1	14.29	0	0
Missing	11	13.1	1	14.29	0	0
Total	84	100	7	100	2	100

Finally, in order to know the two conversion results, this was clarified by or study and the results were 50% for each. One respondent stated that the result of the conversion has worsened the situation of the project, and the other one declared that the project was successfully completed.

- Contractors:

Dominant result for the contract conversion at the contractors' firms is completing the project successfully with a percentage of 44.05%. This result matches with a 50% at the governmental firms because the two respondents divided into two halves. First half shows it is successful conversion, but the contractors have more results for the conversions and most of these results were completing the project successfully.

Contractors' responses represent a percentage of 27.38%, and 17.86% for diminishing the dispute, and enhancing the relationship with the owner which is not chosen by the governmental ministries as a result for the contract conversion. Contractors replied and have chosen these answers as neutral reply.

Lastly governmental ministries replied that the conversion has worsened the project situation, while the contractors did not specify exactly the answer for the contract conversion.

- Private owners:

Project completion successfully was reported by 42.860% of the private owners' responses. This percentage opposed by 50% from the governmental firms for the limited respondents who practiced the conversion.

Private owners' responses represent a percentage of 28.6%, and 14.29% for diminishing the dispute and enhancing the relationship with the owner, which were not chosen by the governmental ministries as a result for the contract conversion. Private owners replied and choose these answers as a neutral result of conversion.

Lastly governmental ministries replied that the conversion has worsened the project situation, while the contractors did not specify exactly the answer for the contract conversion.

TABLE 86. Comparison of all respondents results of contract conversion

Conversion results	No. of respondents – contractors	Percent - contractors (%)	No. of respondents - private owner	Percent - private owner (%)	No. of respondents - governmental ministry	Percent - governmental ministry (%)
Project was completed successfully	23	44.2	8	40	1	50

Diminished Disputes	14	26.9	4	20	0	0
Better relationship between parties	9	17.3	3	15	0	0
Missing	6	11.5	5	25	1	50
Total	52	100	20	100	2	100

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the study

In this thesis we studied the reasons of dispute between the contractor and the client for its importance in the construction industry. Construction industry contributes to the whole country's economy with a good figure. Using the questionnaire, we have designed by the experts, in order to get their opinions in the field in Riyadh, Saudi Arabia. Then we introduced the different types of construction contracts, and classified the dispute sources into: managerial, construction, contractual and financial reasons, and how the construction parties react to solve the disputes.

Gathered data were analyzed using the simple statistics methods, to analyze the reactions of construction industry experts, and at the end introduce new approach for solving the disputes using the construction contract conversion between the contractor and the client.

At the end a combination of situations is formulated to furnish all the factors of dispute, and how to manage the contract away from dispute by offering new approach and highlighting the significant factors that might affect the construction industry.

11.2 Major Findings

1. Construction industry is an environment fertile for disputes, which cannot be avoided, but it can be managed and minimized.
2. Contractors faced disputes in construction projects with a frequency of 2 to 3 times a month, while private owners and governmental ministries faced disputes with a frequency less than twice a month.
3. Most of the signed contracts by the contractors are lump-sum contracts; whereas, the private owners and the governmental ministries mostly sign unit-cost contracts.
4. Main dispute factors by the contractors are:
    - Weakness in contract language and instrument
    - Change in the item description and quantities in the BOQ
    - Inaccurate specification of the items.
    - Ambiguities in the contract documents
    - Contradiction between the project documents.
    - Sizable variation orders that exceeds the maximum allowable percentage in the standard contract.
    - Un-realistic time schedule of the project
    - Interfering in the contract execution by the client in a negative manner affecting the project severely.
    - Low quality in administration processes
    - Inaccurate BOQ in the lump-sum contract
5. Main dispute factors by the international contractors are:
    - Weakness in contract language and instrument
    - Un-awareness of the governing of the commercial regulations.
    - Changes in the item description and quantities in the BOQ

- Ambiguities in the contract documents.
- Contradiction between the project documents.
- Un-realistic time schedule of the project
- Inaccurate BOQ in the lump-sum contract

6. Main dispute factors from the private owners' point of view are:
    - Inaccurate specification of the items.
    - Ambiguities in the contract documents.
    - Contradiction between the project documents.
    - Unrealistic time schedule of the project
    - Inaccurate BOQ in the lump-sum contract.
7. Main dispute factors from the governmental ministries' point of view are:
    - Weakness in contract language and instrument.
    - Change in the item description and quantities in the BOQ.
    - Inaccurate specification of items.
    - Ambiguities in the contract documents.
    - Contradiction between the project documents.
    - Changing the project specification after the material approval.
    - Sizable variation orders that exceeds the maximum allowable percentage in the standard contract
    - Lack of Setting a reference for the disputes between the client and the contractor.
    - Delays in handing over the site to the contractor.
    - Interfering in the contract execution of the contract by the client in severe affecting way.
    - Low quality in administration processes

- Inaccurate BOQ in the lump-sum contract

8. Nature of dispute from the contractors', private owners' and governmental ministries' point of view is due to contractual and financial issues.
9. All the experts from the entire construction spectrum agreed on holding or suspending the disputed scope and mitigating the dispute as a usual reaction toward the dispute as a combined reaction.
10. Contractors are familiar with the contract conversion concept as an option to resolve the dispute, and they mostly changed the lump-sum contract to unit-cost.
11. Contractors mainly changed the contract due to undefined quantity of contract, which leads to successful completion of the project.
12. Private owners are not familiar with the contract conversion concept as an option to solve the dispute and they also change the lump-sum contract to unit-cost in the seldom cases.
13. Private owners changed the contract mainly due to financial constrictions, which leads to successful completion of the project. .
14. Governmental ministry's seldom convert the contract to solve the dispute. This conversion happened from lump-sum contract to unit-cost.
15. Governmental ministries changed the contract mainly due to financial constraint and undefined quantity of contract, which leads somehow to successful completion of the project.

11.3 Conclusion

1. There is a lack of understanding of the basic types of construction contract, and the selection of each type according to the type of project.
2. Dispute does not usually result from one single reason, but it is results from a combination of two or more factors.
3. Weakness in project planning and scheduling, and crashing the project tasks, cause lots of disputes between the client and the contractor, after the failure to comply with the committed project milestone.
4. Preparatory team of the project documents and supervision team have the major role if defect in preparing the project documents were found.
5. Undefined quantity and description of the items in construction contract is a main factor of dispute.
6. The followed reactions toward dispute usually taken (mitigation and holding of the disputed scope of work area) do not solve the disputes permanently and reduce the frequency of dispute.
7. Major flaws in applying the recent managerial approaches in research and neglecting them in construction, are indicated from the research.
8. Contractors tend to increase the overtime and crashing the non-critical activities tasks in construction without studying properly the critical path method and activities, which increases the total cost of the project.
9. Contractors seem to prepare inaccurate time schedule of the projects.
10. Training of the owners might be neglected, and especially the importance of the timely correct decisions.
11. International contractors highlighted inaccurate BOQ of the project more than the national contractors.

12. The governmental regulation to organize the labor market and work force affects directly the final deliverable of the project, which is not considered during the procurement of the project by the contractors at the initial stage of the project, and in the supply chain management of the project.
13. Governmental infra-structure drawing and as-built is not recorded properly, which might cause a lot of time waste for shifting the services and coordination after the excavation.
14. Governmental data-base for the contractors' performance seems to be not accurately updated.
15. Management and contract management is an international cause of construction dispute, which consent with the construction industry market in the research community.
16. Contract conversion shown to be an effective option to diminish the dispute forever and successfully complete the project, though it is not widely used and familiar at all the construction stakeholders.
17. Governmental regulation might be in need for updating soon in order to adapt to the change and dynamic demand of the construction industry.

5.4 Recommendations

1. An extra care should be taken during the preparation of the BOQ in lump sum contracts.
2. The feasibility study of the project, with a near to accurate estimates of the project budget is overlooked, or not prepared properly which needs to be avoided.

3. Review the design, value engineering, and project management procedure during the pre-construction phase, and implement them with a periodic review to highlight any deviation to avoid and prevent any disputes.
4. To formulate the possible dispute in a simple numerical equation to be plugged and calculated, and finally compared to a reference figure to proceed with the conversion or not.
5. Agree and set an early alerting system to locate the high possibility areas of dispute in a cooperative way and give a time frame for rectification and modifying these possibilities.
6. Allow a reasonable time for the design team to formulate the project documents with the minimal possible errors.
7. Follow more efficient quality control and techniques to minimize the mistakes and mismatch in design and utility provisions.
8. Formalizing the conversion process between the client and the contractor in the construction contracts to avoid any future misinterpretation between the parties.
9. Consult experts and lawyers to read the project contract and documents before the bidding.
10. Use the standard contract provisions that have been used successfully to avoid overlooking any articles in contract or writing any vague sentences. A good reference is ASCE booklet "Avoiding and Resolving Disputes During Construction: Successful Practices and Guidelines".
11. Implement the critical path method for planning and scheduling to formulate a real project schedule.

12. Effective usage of management techniques and procedure to avoid the disputes and the escalation of disputes into conflicts.
13. Enroll the construction stakeholders in an educational program that provides them with an overview of contract documentation, maintaining the records, documentation of extra work or delays, prepare the change order, and to manage the dispute and how to resolve it.
14. Set a proper mechanism for evaluating the variation order, including the direct cost, indirect costs and loss of productivity associated with the variation.
15. Comprehensive agreement on the variation order before commencing the execution of the variation order.
16. Establish a problem solving and cooperation attitude in the project by sharing the risk philosophy between the contractor and the owner.
17. Maintain proper job documentation.
18. Adhere to the inspection and test plan and the set quality standards to avoid any corrective work and over-cost.
19. Procure the fund and work-force according to the planned critical path method in a timely manner, taking into consideration the difficulties in securing the project with these long lead items [30].
20. It is recommended to assign a professional project management team by the private owners and involve them in the responsibilities of the deliverables.
21. Second Degree contractors to improve the quality, and the administration processes.
22. A continuation to this study; to include all the contractors in Saudi Arabia, and to include all the possible reasons of dispute.

23. It is advised to have in the contracts provisions for dispute resolution and contract conversion with a clear reference time limit or standard contract type.
24. Private owners are recommended to mitigate the disputes more and to take more than one single action toward the dispute depending on its nature.
25. To resolve the dispute a combination of step and methods have to be taken, starting from opening a communication channels without any prejudges, then mitigating the dispute with good intentions and ability to compromise the benefit to complete the project.

Appendix (A)

First Degree contractors:

الحالة	الدرجة	اسم المنطقة	اسم المجال	اسم المقاول
مصنف	الاولى	منطقة الرياض	المباني	الشركة السعودية للتعمير
مصنف	الاولى	منطقة الرياض	المباني	شركة مجموعة المرشد القابضة
مصنف	الاولى	منطقة الرياض	المباني	شركة دريك اند سكل السعودية للإنشاءات
مصنف	الاولى	منطقة الرياض	المباني	شركة الاعمال التطويرية المحدودة
مصنف	الاولى	منطقة الرياض	المباني	شركة صرح التقنية للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة الاربعه اركان الدوليه للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة أفراس للتجارة والمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة مبارك عبدالله السويكت وأولاده (السويكت للتجارة والمقاولات)
مصنف	الاولى	منطقة الرياض	المباني	الشركة اللطيفيه للتجارة والمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شـركــة تهــامــه للمقـــاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة ايه بي في روك جروب المحدودة
مصنف	الاولى	منطقة الرياض	المباني	شركة اجا للتجارة والمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة أضواء الخليل للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	مؤسسة بن دايل للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركه دار المعدات الطبيه والعلميه
مصنف	الاولى	منطقة الرياض	المباني	مؤسسة فادن للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة الاريل للمقاولات والصناعه المحدودة
مصنف	الاولى	منطقة الرياض	المباني	شركة عبدالله سعيد السيد وشركاؤة للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة الفنار
مصنف	الاولى	منطقة الرياض	المباني	شركة بن سمار للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة نهضه الاعمار للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة أدكس للمقاولات والصيانة والتشغيل
مصنف	الاولى	منطقة الرياض	المباني	الشركة السعوديه للتشييد
مصنف	الاولى	منطقة الرياض	المباني	الشركة الاولى للمقاولات السعودية
مصنف	الاولى	منطقة الرياض	المباني	الشركة السعوديه اللبنانيه للانشاءات الحديثه
مصنف	الاولى	منطقة الرياض	المباني	شركة السيف مهندسون مقاولون المحدوده
مصنف	الاولى	منطقة الرياض	المباني	شركة بابل للصيانة والتشغيل والتجارة
مصنف	الاولى	منطقة الرياض	المباني	شركة العريني للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة شار
مصنف	الاولى	منطقة الرياض	المباني	شركة محمد محمد الراشد للتجارة والمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة مجموعة المجال العربي
مصنف	الاولى	منطقة الرياض	المباني	شركة تبراك للتجاره والمقاولات
مصنف	الاولى	منطقة الرياض	المباني	مؤسسة عبدالرحمن محمد الملحق للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة المندريه للمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة عبر المملكة السعودية للتجارة والصناعة والمقاولات سبك
مصنف	الاولى	منطقة الرياض	المباني	شركة دار الخيول للمقاولات العامة
مصنف	الاولى	منطقة الرياض	المباني	شركة ثرب للتجارة والمقاولات
مصنف	الاولى	منطقة الرياض	المباني	شركة مجموعه بن جارالله للمقاولات المحدودة
مصنف	الاولى	منطقة الرياض	المباني	شركة جودت للمقاولات المحدودة

مصنف	الاولى	منطقة الرياض	المباني	الشركة العربية السعودية للتجارة والانشاء	
مصنف	الاولى	منطقة الرياض	المباني	شركة ابسل جون بول للمقاولات	
مصنف	الاولى	منطقة الرياض	المباني	شركة مؤنس محمد الشايب للاعمال المدنيه (موبكو)	
مصنف	الاولى	منطقة الرياض	المباني	شركة أتحاد المقاولين ذ.م .م	
مصنف	الاولى	منطقة الرياض	المباني	شركـة انظمه الاتصـالات المتقدمه للمقاولات	
مصنف	الاولى	منطقة الرياض	المباني	شركة الهاشميه للمقاولات	
مصنف	الاولى	منطقة الرياض	المباني	شركة الافق للمقاولات	
مصنف	الاولى	منطقة الرياض	المباني	شركة عزيز للمقاولات والاستثمار الصناعي	
مصنف	الاولى	منطقة الرياض	المباني	الشركة السعودية لخدمات الأعمال الكهربائية والميكانيكية	
مصنف	الاولى	منطقة الرياض	المباني	شركة الرياض للتطوير العمراني المحدودة	
مصنف	الاولى	منطقة الرياض	المباني	شركه الفوزان للتجارة والمقاولات العامة	
مصنف	الاولى	منطقة الرياض	المباني	شركة المعدى للتجارة والمقاولات المحدودة	
مصنف	الاولى	منطقة الرياض	المباني	شركة فوز العالمية للمقاولات	
مصنف	الاولى	منطقة الرياض	المباني	شركة الصغير للتجارة والمقاولات	
مصنف	الاولى	منطقة الرياض	المباني	الشركة السعوديه للتطوير العمراني	
مصنف	الاولى	منطقة الرياض	المباني	شركة المقاول العربى	
مصنف	الاولى	منطقة الرياض	المباني	فرع شركة بكين الامارات الدولية للانشاءات	
مصنف	الاولى	منطقة الرياض	المباني	شركة جوانو وبار اسكفيدس العربية السعودية المحدودة	
مصنف	الاولى	منطقة الرياض	المباني	شـركـة الراشـد أيه بيتـونـج	
مصنف	الاولى	منطقة الرياض	المباني	شركة البلاغة القابضة	
مصنف	الاولى	منطقة الرياض	المباني	شركة تكثير المحدودة	

Second Degree contractors:

الحالة	الدرجة	اسم المنطقة	اسم المجال	اسم المقاول
مصنف	الثانية	منطقة الرياض	المباني	شركة ستكو لاصحابها ابراهيم علي التركي وشريكه
مصنف	الثانية	منطقة الرياض	المباني	شركة جنا للاستثمار والتطوير العقاري
مصنف	الثانية	منطقة الرياض	المباني	مؤسسة سعد المعماريه للمقاولات
مصنف	الثانية	منطقة الرياض	المباني	شركة العبودي للأنشاء والتعمير
مصنف	الثانية	منطقة الرياض	المباني	شركة عبدالعزيز الصغير للاستثمار التجاري
مصنف	الثانية	منطقة الرياض	المباني	شركة فجن المتقدمة
مصنف	الثانية	منطقة الرياض	المباني	شركة النوير الذهبية للتجارة والمقاولات
مصنف	الثانية	منطقة الرياض	المباني	شركة مجموعة العوض للمقاولات
مصنف	الثانية	منطقة الرياض	المباني	شركة الهدف للخدمات المحدودة
مصنف	الثانية	منطقة الرياض	المباني	شركة ابراهيم محمد العبود للتنمية والتطوير
مصنف	الثانية	منطقة الرياض	المباني	مؤسسة جمال عبدالفتاح جارودي للمقاولات
مصنف	الثانية	منطقة الرياض	المباني	شركة الاساس المتحدة المحدودة
مصنف	الثانية	منطقة الرياض	المباني	شركة شبه الجزيره للمقاولات
مصنف	الثانية	منطقة الرياض	المباني	شركة خضوب للتجارة والمقاولات المحدودة
مصنف	الثانية	منطقة الرياض	المباني	شركة الوسام العربي القابضه
مصنف	الثانية	منطقة الرياض	المباني	شركة الحناء التجارية
مصنف	الثانية	منطقة الرياض	المباني	مؤسسة الحفـاوه للتجـاره
مصنف	الثانية	منطقة الرياض	المباني	مؤسسة الحمادي للمقاولات
مصنف	الثانية	منطقة الرياض	المباني	شركة رام المباني للمقاولات المحدودة
مصنف	الثانية	منطقة الرياض	المباني	مؤسسة عبدالعزيز الحجاج للمقاولات
مصنف	الثانية	منطقة الرياض	المباني	شركة شمائل الخليج للمقاولات
مصنف	الثانية	منطقة الرياض	المباني	شركة بيجه السعوديه المحدودة
مصنف	الثانية	منطقة	المباني	شركة أهراس للمقاولات

		الرياض			
مصنف	الثانيـة	منطقة الرياض	المباني	شركة رمال البيضة للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة نجمة المباني للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة عنبر الخليج للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة دلتا البحار للتجارة	
مصنف	الثانيـة	منطقة الرياض	المباني	الشركة العربية للبناء و التجارة المحدودة	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة عبدالعزيز و فيصل ابناء عبدالله سعد الراشد للمقاولات المحدودة	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة بسام شاكر وشريكه للمقاولات المحدودة	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة التجارات	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة حمد الصغير للإستثمار التجاري	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة ارزام للتجارة والمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة ناصر صالح أبوفارع وشركاه	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة النجدين للمقاولات والتجارة	
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة اللين و الاعمار للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة عبداللطيف الراشد للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	الشركة الخليجية الأولى للتعهدات والمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة اعمار البسيطه للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة إبراهيم صالح محمد المطرودي للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	فرع الشركة المتحده للانشاءات المدنيه	
مصنف	الثانيـة	منطقة الرياض	المباني	مجموعة شركات الظاهري	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة مهمات الشرق الاوسط	
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة صحراء ستار للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة ركن القصور التجارية	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة نجمة المشاريع للمقاولات	
مصنف	الثانيـة	منطقة الرياض	المباني	شركة العمر للمقاولات	

مصنف	الثانيـة	منطقة الرياض	المباني	شركة شام للمقاولات المحدودة
مصنف	الثانيـة	منطقة الرياض	المباني	شركة عبدالله عبدالكريم العثيم المتحدة
مصنف	الثانيـة	منطقة الرياض	المباني	مجموعة البلاد الوطنية
مصنف	الثانيـة	منطقة الرياض	المباني	شركة مدار النور للمقاولات والتعدين
مصنف	الثانيـة	منطقة الرياض	المباني	شركة سما المنار للمقاولات والتجارة المحدودة
مصنف	الثانيـة	منطقة الرياض	المباني	شركة العتاق للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	شركة المشرق للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	شركـــة الصخـور الســعوديه للتنميــه
مصنف	الثانيـة	منطقة الرياض	المباني	الشركة السعودية للاعمار والمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	شركة مجموعة النخلات الثلاث للتجارة المحدودة
مصنف	الثانيـة	منطقة الرياض	المباني	شركة غصون الخير للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة عبدالله بن علي السلامه للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	شركة الهدا للمقاولات المحدودة
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة أسس التنفيذ للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	شركة اعمار الشريف للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	شركة تدارك الانشائية للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة السهول البيضاء للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	مؤسسة اضواء للمقاولات
مصنف	الثانيـة	منطقة الرياض	المباني	شركة الاعمار والتنمية المحدودة
مصنف	الثانيـة	منطقة الرياض	المباني	شركة ميلاف السعودية
مصنف	الثانيـة	منطقة الرياض	المباني	شركة فن المعمار السعودية للصيانة المحدودة

Appendix (B)

Questionnaire

King Fahd University of Petroleum and Minerals

College of Environmental Design

Construction Engineering & Management Department

Dear Sir,

Subject: Study the reasons of construction contract convertibility

The study is being performed on the construction's most common reasons for disputes in contract, and the common reaction toward these reasons, and proposes a new approach for solving the dispute among the construction contractors in Riyadh, Saudi Arabia. The major purposes of the researcher are to understand the current contractor selected approach implemented in Riyadh, Saudi Arabia to solve the contractual disputes, and enhance the performance in the construction industry.

The questionnaire consists of four sections. Each section aims to gather different information from the respondents as follows:

a. Section I: General information about the respondents.

b. Section II: Identifying the common construction contractual disputes.

c. Section III: Usual reaction to solve these disputes.

d. Section IV: pair-wise comparison between dispute reason and the usual reaction to determine the relative importance for each dispute compared with others, among the new approach.

On the appropriate space please tick (√) and leave other blank. Some questions require you to write your answer in the space provided if possible.

It would be highly appreciated if you feedback the researcher of the study with your answers to the best you know, and assuring you that all the answers will be treated confidentially and only for educational purposes.

Kindly, after filling this questionnaire return it to the following address:

Thank you in advance and anticipating your cooperation.

Best regards

Mr. Salah Ibrahim Habash

Construction Engineering & Management Department

King Fahd University of Petroleum and Minerals

Dhahran 31261 P.O box 8699

Saudi Arabia

E-mail: salahhabash@gmail.com

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Section I: Respondent characteristic

1. Respondent information

Name (Optional)	
Telephone no. (Optional)	
Facsimile (Optional)	
E-Mail Address (Optional)	

2. What is your level of education?

Bachelor Degree	
Master Degree	
PhD	
Others, please specify	

3. What is your job title?

Construction manager	
Project manager	
Architect	
Cost manager	
General manager	
Director	
Other, please specify	

4. What is your role during the construction project?

Decision maker	
Advisory	
Assessment	
Others, please specify	

5. How long have you been in the construction industry?

Less than 5 years	
5 to less than 10 years	
10 to less than 20 years	
20 years and more	

6. How many projects have you participated in over the last ten years?

Less than 5 projects	
5 to less than 10 projects	
10 to less than 20 projects	
20 projects and more	

7. What is the nationality of your employer contractor?

National		International		Other, Please specify	

8. What is the percentage of type of projects that you have participated in their construction in Saudi Arabia:

Governmental		Private		Others, Please specify	

9. What are the percentages of the type of contracts that are used Private owner in acquired construction projects?

Cost-plus		Lump sum		Unit price	

10. How many contractual disputes occur in a project per month?

a. Less than two times a month	
b. 2 to less than 3 times a month	
c. 3 to less than 5 times a month	
d. 5 times and more a month	

Section II: Identifying the common construction contractual disputes.

1. The followings are potential factors that might cause a dispute between the contractor and the client. You are kindly requested to indicate the level of frequency of each potential factor by placing a tick (√) in the scale next to each parameter.

   (Significant means affects the milestone of the project, and exceeds the positive sum)

S/N	Description	Frequency				
		Very High	High	Somewhat High	Low	Very Low
1	Weakness in contract language and instrument					
2	Un-awareness of the governing rules in the appendixes					
3	Un-awareness of the governing rules that regulate the work in the country					
4	Un-awareness of the governing of the commercial regulations					
5	Long period of project hold					
6	Un-awareness of the project milestones					
7	Un-awareness of the stated construction method					
8	Change in the item description and quantities in the BOQ					

9	Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work) contract.					
10	Inaccurate specification of items					
11	Ambiguities in the contract documents					
12	Contradiction between the project documents.					
13	Mixing the lump-sum item and the unit-price items in the same contract					
14	Changing the project specification after the material approval					
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract					
16	Ambiguity in the project boundaries					
17	ambiguity in project responsibilities between the contractor and the client					
18	Lack of Setting a reference for the disputes between the client and the contractor					
19	Un-realistic time schedule of the project					
20	Delays in handing over the site to the contractor					
21	Interfering in the contract execution of the contract by the client in severe					

	affecting way					
22	Delay of response to the requested decisions by the client					
23	Un-skilled contractor workers					
24	Shortage of the skilled workers in the labor market					
25	Sizable sub-contractors and out-sourcing					
26	Error in developing the bidding such as estimation					
27	Lack of quality					
28	Low quality in administration processes					
29	Fault negotiation procedure between the parties					
30	Inaccurate BOQ in the lump-sum contract					

2. Usual disputes are related to (please tick √ in the most repeated dispute source):

Disputes related to financial	
Dispute related to construction	
Dispute related to contract	
Dispute related to management Others, please Specify 5 ---------- 6 ---------- 7 ---------- 8 ----------	

Section III: Usual reaction to solve contractual disputes.

1. What is most common practice that is taken toward disputes? Please tick the best answer

Hold the disputed scope	
Hold the whole project	
Mitigate the dispute	
Sacrifice the benefit to continue the project	
Others, please specify a. ---------- b. ---------- c. ---------- d. ----------	

2. The followings are common reaction practices toward disputes. You are kindly requested to indicate your agreement by placing a tic (√) on the given agreement scale>

Reaction Practice	Agreement Level				
	Strongly Agree	**Somewhat Agree**	**Agree**	**Somewhat Disagree**	**Strongly Disagree**
Hold the work in the disputed scope					
Hold the work in the whole project					
Sacrifice the benefit of the disputed work to complete the job					
De-scope the disputed work					
re-negotiate the terms of the disputed work					
Change the contract terms					
Changing the contract with the manpower supplier to overcome the limited cost of skilled manpower					
consult an arbitrator					
make a case in the court Others, please specify and measure j. ---------- k. ---------- l. ---------- m. ---------- n. ---------- o. ----------					

Section IV: contract type conversion:

1. Have you experienced contract conversion from one type to another?

   Yes [ ] if yes continue

   No [ ] if no, then go question number 5 of this section

2. From what type of contract to what type of contract was the conversion?

   From Lump-sum to Unit-cost [ ]

   From Lump-sum to Cost-plus [ ]

   From unit-cost to cost-plus [ ]

   Other, Please specify ----------

3. What was the reason for the conversion?

   Financial constrain

   Undefined project scope

   Undefined quantity of work

   Other. Please specify ----------

4. What was the results of the conversion?

   Project was completed successfully [ ]

   Diminished the dispute [ ]

   Better relationship between the parties [ ]

   Other, please specify ----------

5. The followings are potential situations for contract conversion. You are kindly requested to express your opinion on the agreement of the situation by placing a tic (X) in the appropriate box next to the potential situation:

Potential situation	Level of agreement				
	Strongly agree	Somewhat agree	Agree	Somewhat disagree	Disagree

Appendix (C)

Reliability Statistics

Cronbach's Alpha	N of Items
.883	29

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Weakness in contract language and instrument	90.04	231.512	.337	.881
Un-awareness of the governing rules in the appendixes	91.23	225.546	.482	.878
Un-awareness of the governing rules that regulate the work in the country	91.29	226.163	.478	.879
Un-awareness of the governing of the commercial regulations	91.14	228.937	.374	.881
Long period of project hold	91.24	222.549	.516	.877
Un-awareness of the project milestones	90.90	225.354	.471	.879
Un-awareness of the stated construction method	90.66	225.684	.459	.879
Change in the item description and quantities in the BOQ	90.03	223.717	.478	.878
Imposing un-fair contract conditions on other contract party by the high power authority's (like the public work)contract.	91.12	225.090	.472	.879
Inaccurate specification of items	89.85	223.895	.503	.878
Ambiguities in the contract documents	89.76	223.941	.494	.878
Contradiction between the project documents.	89.57	224.424	.517	.878
Mixing the lump-sum item and the unit-price items in the same contract	91.37	227.593	.410	.880
Changing the project specification after the material approval	90.37	225.948	.459	.879
Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	90.13	224.962	.529	.877
Ambiguityin the project boundaries	90.84	226.127	.445	.879
ambiguity in project responsibilities between the contractor and the client	90.99	227.331	.400	.880
Lack of Setting a reference for the disputes between the client and the contractor	91.02	225.386	.486	.878
Un-realistic time schedule of the project	89.79	225.669	.493	.878
Delays inhanding over the site to the contractor	90.88	226.394	.459	.879
Delay of response to the requested decisions by the client	90.11	228.507	.397	.880
Un-skilled contractor workers	90.85	229.534	.319	.882
Shortage of the skilled workers in the labor market	90.76	228.811	.338	.882
Sizable sub-contractors and out-sourcing	90.70	228.124	.369	.881
Error in developing the bidding such as estimation	90.99	228.039	.399	.880
Lack of quality	90.93	228.376	.362	.881
Low quality in administration processes	90.19	230.738	.319	.882
Fault negotiation procedure between the parties	91.31	230.172	.368	.881
Inaccurate BOQ in the lump-sum contract	89.65	234.539	.247	.883

Appendix (D)

Normal distribution test

Explore

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Total specimen	Sig.	Statistic	Total specimen	Sig.
Weakness in contract language and instrument	.333	182	.000	.809	182	.000
Un-awareness of the governing of the commercial regulations	.242	182	.000	.878	182	.000
Un-awareness of the stated construction method	.221	182	.000	.903	182	.000
Change in the item description and quantities in the BOQ	.237	182	.000	.841	182	.000
Inaccurate specification of items	.249	182	.000	.798	182	.000
Ambiguities in the contract documents	.300	182	.000	.768	182	.000
Contradiction between the project documents.	.350	182	.000	.696	182	.000
Changing the project specification after the material approval	.227	182	.000	.897	182	.000

Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	.282	182	.000	.859	182	.000
Un-realistic time schedule of the project	.248	182	.000	.807	182	.000
Delay of response to the requested decisions by the client	.229	182	.000	.874	182	.000
Un-skilled contractor workers	.194	182	.000	.908	182	.000
Shortage of the skilled workers in the labor market	.201	182	.000	.905	182	.000
Sizable sub-contractors and out-sourcing	.201	182	.000	.909	182	.000
Lack of quality	.219	182	.000	.901	182	.000
Low quality in administration processes	.238	182	.000	.882	182	.000
Inaccurate BOQ in the lump-sum contract	.266	182	.000	.780	182	.000
a. Lilliefors Significance Correction						

APPENDIX E

Calculation of the main dispute reasons

SN	Construction contractual disputes	(Grouping variable) Contractors	N	Mean Rank	*Test Statistics (df=3)*	
					Chi-Square	*P value*
1	Weakness in contract language and instrument	National	101	92.00	8.625	.035*
		International	13	83.23		
		Ministry	23	115.57		
		Private owner	45	80.48		
4	Un-awareness of the governing of the commercial regulations	National	101	75.90	34.083	.000**
		International	13	84.62		
		Ministry	23	139.76		
		Private owner	45	103.83		
7	Un-awareness of the stated construction method	National	101	83.88	7.275	.064
		International	13	94.65		
		Ministry	23	114.15		
		Private owner	45	96.12		
8	Change in the item description and quantities in the BOQ	National	101	91.67	5.823	.121
		International	13	93.42		
		Ministry	23	111.43		
		Private owner	45	80.38		
10	Inaccurate specification of items	National	101	85.90	4.593	.204
		International	13	85.00		
		Ministry	23	107.26		

		Private owner	45	97.90		
11	Ambiguities in the contract documents	National	101	88.10	2.267	.519
		International	13	84.42		
		Ministry	23	93.28		
		Private owner	45	100.26		
12	Contradiction between the project documents.	*National*	101	88.79	1.174	.759
		International	13	87.62		
		Ministry	23	97.15		
		Private owner	45	95.81		
14	Changing the project specification after the material approval	National	101	83.60	14.968	.002**
		International	13	107.35		
		Ministry	23	126.35		
		Private owner	45	86.83		
15	Sizable variation orders that exceeds the maximum allowable percentage in the standard contract	National	101	83.07	16.388	.001**
		International	13	74.00		
		Ministry	23	126.00		
		Private owner	45	97.84		
19	Un-realistic time schedule of the project	National	101	89.34	10.564	.014* .
		International	13	62.46		
		Ministry	23	116.59		
		Private owner	45	91.92		
21	Delay of response to the requested decisions by the client	National	101	91.49	14.437	.002**
		International	13	79.92		
		Ministry	23	125.33		
		Private owner	45	77.58		
22	Un-skilled contractor workers	National	101	79.59	33.637	000**

		International	13	86.54		
		Ministry	23	72.33		
		Private owner	45	129.47		
23	Shortage of the skilled workers in the labor market	National	101	89.41	35.177	.000**
		International	13	98.00		
		Ministry	23	42.33		
		Private owner	45	119.46		
24	Sizable sub-contractors and out-sourcing	National	101	85.28	9.264	.026*
		International	13	103.73		
		Ministry	23	77.61		
		Private owner	45	109.03		
26	Lack of quality	National	101	80.56	36.386	.000**
		International	13	96.69		
		Ministry	23	63.20		
		Private owner	45	129.02		
27	Low quality in administration processes	National	101	85.69	4.398	.222
		International	13	84.42		
		Ministry	23	104.85		
		Private owner	45	99.77		
29	Inaccurate BOQ in the lump-sum contract	National	101	87.17	12.111	.007**
		International	13	64.46		
		Ministry	23	118.52		
		Private owner	45	95.22		

Table 19: Kruskal-Wallis Test for the differences in common important construction contractual disputes according to the nationality of the contractors

*(P<0.0 * Significant at .05, ** significant at 0.01)*

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Vita

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Education:

Master of Science in construction engineering and management
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University of king Fahad University for petroleum and minerals, KSA

Dissertation title: "Disputes and convertibility of lump sum contracts in Saudi Arabia", Advisor: Professor Ali Shash

Bachelor degree in mechanical engineering 2004

Al-Palqa' applied university, Jordan

Research interest:

Research in construction contracts, management and operation researches.

Research experience:

Graduate studies for the thesis of "Disputes and convertibility of lump sum contracts in Saudi Arabia", 2019

Undergraduate study in Jordan annual requirement in crude oil and power, 2002

Conference Presentation:

Presentation of "material potential: the break down threshold" in the scientific day for the Jordanian engineers association 2001

Professional experience:

Construction manager 2017-2018 King Fahad medical city

Drake and Scull international Riyadh, Saudi Arabia

Construction manager 2011-2017 Information technology and communication complex

Saudi Bin Laden group Makkah, Saudi Arabia

Senior mechanical engineer 2004 - 2011 Makkah Clock tower (tenth tallest building in the world)

Prior work experience:

- Self employed contractor in King Abdullah economic city working in infra-structure piping

- Application engineer at Al Mazar engineering, Jordan
- Trainee engineer at Atlas Copco overhauling the air compressors, Jordan

University service:

- Associate organizer for the scientific day in Al-Palqa' applied university, 2001 and 2002.

- Active member in the student council in the engineering faculty during all the undergraduate years.

Technical skills:

- Programming language and mathematical package: Matlab, C, C++

- Computer aided design/engineering AutoCAD

- Other: SPSS, Windows OS, MS office.

Reference:

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